THE UNIVERSITY OF TEXAS AT AUSTIN

RECOMMENDATION FOR CHANGE IN ACADEMIC RANK/STATUS

Name Zoldan, Janeta EID jz7996 Present Rank Assistant Professor

Years of Academic Service *(Include AY 2019-20 in each count)*

At UT Austin since 9/1/2013 (month/day/year) Total Years at UT Austin 7

In Present Rank since 9/1/2013 (month/day/year) Total Years in Present Rank 7

Tenure-track only
Number of Years in Probationary Status 6

Additional information Probationary Extension 2013-14

Primary Department Biomedical Engineering

College/School Engineering, Cockrell School of

Joint Department N/A

College/School N/A

Other Department(s) N/A

Recommendation actions[1]

By Budget Council/Executive Committee Promote

Vote[2] for promotion 11, Against 0, Abstain 0, Absent 1, Ineligible to vote 1

By Department Chair Promote

By College/School Advisory Committee Promote

Vote[2] for promotion 6, Against 1, Abstain 0, Absent 0, Ineligible to vote 0

By Dean Terminal Appointment

Administrative Action Promote to Associate Professor

Date Action Effective September 1, 2020
(To be submitted to the Board of Regents as part of the annual budget)

By _____ Date April 9, 2020
For the President

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[1] See "Chart of Recommended Actions" for eligible recommended actions applicable to specific conditions and administrative levels

[2] Record all votes for and against promotion, abstentions by eligible voting members, and the number of absent eligible voting members The number of committee members ineligible to vote should also be recorded Enter zero where it would otherwise be blank

EVPP/4 15

EXHIBIT
P's 174

The University of Texas at Austin
Cockrell School of Engineering

Dean's Assessment
Janeta Zoldan
Department of Biomedical Engineering
Cockrell School of Engineering

Dr. Janeta Zoldan received her BSc in chemistry in 1995 from Hebrew University of Jerusalem (Israel), and her MSc and PhD in materials engineering from Technion – Israel Institute of Technology in 1999 and 2004, respectively.

Dr. Zoldan's path from graduate student to faculty member was longer than many of our recent hires. After completing her PhD, Dr. Zoldan spent two years as a postdoctoral fellow in biomedical engineering at Technion. She then moved to MIT and spent four years as a postdoctoral fellow, one year as a research associate, and one year as the director of a nanotechnology core facility in the Koch Institute for Integrative Cancer Research. She joined the Department of Biomedical Engineering (BME) as an assistant professor in September 2013. If promoted to associate professor in September 2020, she will have accumulated six years of probationary service.

Dr. Zoldan's work is at the interface of biomaterials, biophysics, and stem cell bioengineering. She uses induced pluriponent stem cells[1] to understand and control the cardiovascular tissue formation process. Her work has implications on a wide variety of illnesses, including stroke and heart failure. Her work is directly related to the Cockrell School's research priority of *reinventing human health through engineering*.

Ten external letters from arm's length reviewers were submitted as part of the promotion dossier, with six letter writers selected by the budget council. All the letter writers are faculty at peer US institutions. One reviewer is a member of the National Academy of Engineering (NAE) and one is a member of both NAE and the National Academy of Medicine (NAM). Two additional letters were requested, but one potential letter writer declined without citing a reason and one did not respond.

Teaching

While in rank, Dr. Zoldan taught one required undergraduate lecture course and two electives that are cross-listed at the undergraduate and graduate levels. During her first few years on the faculty, Dr. Zoldan's CIS scores were highly variable. Her instructor ratings varied from 3.1 in large lecture classes to 4.9 in small classes directly related to her research.[2] However, since the 2017 spring semester, her instructor ratings have ranged between 4.0 and 4.4, which places her near the median for the Cockrell School. In her teaching statement, Dr. Zoldan addressed the changes that she has made to improve her classes based on concerns expressed by the students.

Research

During her third-year review, the budget council raised concerns about the sustainability of Dr. Zoldan's research funding and emphasized the importance of securing federal funding. The budget council also noted the need to publish with students from her own research group. Dr. Zoldan was

[1] Stem cells that are generated directly from adult cells.

[2] Instructor ratings of 3.5 and lower are in the lowest decile and ratings of 4.8 and higher are in the highest decile for tenured and tenure-track faculty teaching courses in the Cockrell School.

given specific targets for her promotion dossier: (1) secure federal grant funding for two projects such that she could support a research group of four or more PhD students after promotion, and (2) ensure that she had five representative publications from her laboratory as the senior author.

Key metrics of Dr. Zoldan's performance in rank include:

- 20 archival journal publications in rank (34 total). She published 10 journal papers based on the research conducted in her lab at UT as the corresponding author.
- Many of her papers in rank are published in high impact journals, such as *Biomaterials Science* (IF=5.25), *Regenerative Biomaterials* (3.38), *Experimental Cell Research* (3.33), and *Integrative Biology* (2.77).
- 2 US patent applications published in rank based on work conducted at UT.
- An h-index of 13 and 984 citations.[3] (Google Scholar)

While in rank, Dr. Zoldan secured three research grants totaling $1.0 million in external funding (her share is $0.95 million) from the American Heart Association, the Alliance for Regenerative Rehabilitation Research and Training, and the National Institutes of Health.[4] She is the PI on all three grants. In September 2019, she was notified that she received a Trailblazer Award from NIH.[5] This is the only grant that extends beyond the end of the 2019-20 academic year.

In her dossier, Dr. Zoldan lists eight proposals totaling $8.8 million ($6.4 million her share) as pending. To date, none of these proposals has been funded and only two are currently under review. Dr. Zoldan plans to resubmit five of the proposals.

The letters from the ten external reviewers were overwhelmingly positive, and all discussed the important research developments that Dr. Zoldan and her lab have made. Because Dr. Zoldan was not notified of the Trailblazer Award from NIH until September, the version of her CV that was sent to the external reviewers listed her total research funding as $0.4 million. Eight of the ten reviewers commented on her modest levels of research funding, but most described other strengths as mitigating factors.

- John Fisher (Maryland) stated, "Overall, I believe Dr. Zoldan's ability to secure external funding is adequate." In his closing paragraph, he noted, "Dr. Zoldan's ability to secure external funding is likely a concern. Mitigating strengths include her graduate student mentorship and service to the university and scientific communities."
- Andrés García (Georgia Tech) observed, "She has secured grants from the American Heart Association and the Alliance for Regenerative Rehabilitation Research and Training, and has several pending NIH, NSF, and American Heart Association proposals."

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[3] Dr. Zoldan's most highly cited paper has 250 citations and is based on work completed at MIT. Her most highly cited paper since she joined the faculty at UT Austin has 41 citations and is based on experiments conducted while she was a research scientist at MIT. Her most highly cited paper based on research conducted in her laboratory at UT has 12 citations.

[4] At the time of her third-year review, Dr. Zoldan had only received one grant from the American Heart Association for $0.3 million.

[5] The Trailblazer R21 Award is designed to provide an opportunity for new and early stage investigators to pursue research programs of high interest to the National Institute of Biomedical Imaging and Bioengineering at the interface of the life sciences with engineering and the physical sciences.

- Sharon Gerecht (Johns Hopkins) noted, "Overall, she has been awarded 2 grants, with another 5 pending. This is a noteworthy accomplishment given the early stage of Janet's career and the current highly funding era."
- David Kaplan (Tufts) observed, "There are no NSF or NIH grants funded to date, although there are numerous fellowships awarded to her students via these federal agencies. The overall grant support is a bit thin, but with a number of NIH proposals in review it would appear that Prof. Zoldan is very active in continuing to pursue additional funding for her group."
- Antonios Mikos (Rice, NAE, NAM) noted, "The quality and integrity of Janet's research effort coupled with her promise for continued success resulted in her funding as Principal Investigator on two projects funded by the American Heart Association and the Alliance for Regenerative Rehabilitation Research and Training."
- Brenda Ogle (Minnesota) stated, "I am not sure if there are completed proposals not listed on her CV. If not, the amount of funding for her level is less than average, but should be considered in the context of incredible competition in the cardiovascular space." She noted in her concluding paragraph, "She is working hard to bolster her funding record with multiple proposal submissions and with networks and collaborations beyond her home institute."
- Sean Palecek (Wisconsin) observed, "The one area Prof. Zoldan lags her peers is obtaining federal funding. ... I have seen numerous dossiers similar to Dr. Zoldan's where the funding lags the scientific publications and I weigh her contributions to the literature much more heavily than the lack of success at receiving federal funds."
- William Wagner (Pittsburgh) stated, "To support the above mentioned focused research effort, Dr. Zoldan has demonstrated her ability to attract funding from the very competitive American Heart Association, and continues her efforts to secure NIH and NSF funding with several significant pending proposals that would have a significant impact on her laboratory if funded." He noted in his concluding paragraph, "While she has not yet been awarded a major grant as PI from the NIH, she has received competitive funding and her productivity has been high."

Advising and Student Mentoring

Dr. Zoldan graduated two PhD students and two MS students, and she mentored one postdoctoral fellow. She is currently advising one PhD student and one postdoctoral fellow. She has also integrated 25 undergraduate students into her research team.

University Service

Dr. Zoldan's service to the university has primarily been related to graduate student admissions and faculty recruiting.

Professional Service

Dr. Zoldan is a member of the Biomedical Engineering Society and the Society for Biomaterials. She actively participates in both through conference organization. She served as the member of the scientific advisory board for the Tissue Engineering and Regenerative Medicine International Society World Congress in 2019. She is also the elected secretary-treasurer of the Engineering Cells and Their Microenvironments Special Interest Group within the Society for Biomaterials.

Other Evidence of Merit or Recognition

Dr. Zoldan received a Scientist Development Grant[6] from the National Heart Association in 2015. Her work was highlighted in the Emerging Investigators 2017 issue of *Biomaterials Science*.[7] In September 2019, Dr. Zoldan was notified that she received a R21 Trailblazer grant from NIH.

Overall Assessment

I believe that Dr. Zoldan has made progress since her third-year review in securing research funding from competitive sources (NIH) and that she placed emphasis on publishing the results of her independent research. Dr. Zoldan is a very good teacher and an outstanding mentor.

In spite of the strong external letters, the support from the budget council, and the support from the Cockrell School's promotion and tenure committee,[8] I have serious concerns about the sustainability of Dr. Zoldan's external research funding. While the budget council discussed this issue explicitly, I disagree with their conclusion. A faculty member with an active lab cannot be successful without funding to support their research group. As discussed by the department chair, a tenured faculty member doing experimental work within BME needs $200,000 to $250,000 in direct costs annually to support their research activities. The Trailblazer Award provides $400,000 in direct costs over three years. So, even with this new award from NIH, Dr. Zoldan will not be able to meet expectations for a "research active faculty member" in BME.[9]

My concerns are further exacerbated by the fact that Dr. Zoldan submitted 38 proposals totaling more than $36 million in external funding (~$32 million her share) that were not funded during her probationary period. I disagree with the external reviewers that her external funding is likely to increase appreciably in the future. Not counting the two proposals that are currently under review, only three of her 41 proposals have been funded (7% of the proposals corresponding to 3% of the requested funding). Therefore, I do not believe that Dr. Zoldan has met expectations for establishing a sustainable, externally funded research program during her probationary period.

Accordingly, I recommend a terminal appointment.

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Sharon L. Wood, Dean
13 November 2019

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[6] Approximately 5% of the applications were funded.

[7] Thirty-two faculty members from around the world were featured in this themed issue, which highlighted the best work from scientists in the early stages of their independent careers. The journal is published by the Royal Society of Chemistry.

[8] The Cockrell School's promotion and tenure committee voted anonymously. No information is available regarding the reason for the negative vote.

[9] According to the department's workload policy, a faculty member must be able to support four GRAs or postdoctoral fellows in order to teach one course a semester, which is the normal teaching load.

COCKRELL SCHOOL OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

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Department of Biomedical Engineering Chair's Statement for Promotion

Candidate Name **Janeta "Janet" Zoldan**

Prepared by **Shelly Sakiyama-Elbert, Ph.D., Department Chair**

Preparer Signature

Budget Council Recommendation

The Department Budget Council (BC), consisting of all full professors in the department, met on September 3, 2019 to discuss the department's promotion and tenure cases The promotion dossiers of the candidates, including the BC assessments, were made available to the BC in electronic form (UTBox) prior to the meeting At the meeting, a vote was conducted by secret paper ballot rating the candidates on each of the areas of evaluations, as well as an overall recommendation on promotion Of the 13 BC members (including the Department Chair), 12 members attended the meeting (one via phone) and participated in the discussion, and one member shared their comments prior to the meeting

Because of the department was notified of a new grant award on 9/18/19, the Budget Council was reconvened on September 24, 2019 A new vote was taken at the meeting following discussion of Dr Zoldan's dossier as revised following notification of a new grant award and it is this result that is reported below

At the meeting, the BC statements were presented by the member responsible for assessing that area (teaching, research, advising, service, or honors) Dr Zoldan's teaching was discussed by the BC, and it was noted that she has compiled a strong record of teaching BME's teaching load expectation is one course per long semester Professor Zoldan has taught two undergraduate courses and one graduate course over a period of ten semesters More specifically she has taught BME 352 "Engineering Biomaterials", BME 379 "Tissue Engineering" and BME 382J "Stem Cells Cell and Tissue Engineering" (grad) Her average graduate Overall Instructor CIS rating is 5 0 and her average undergraduate Overall Instructor CIS rating is 4 16 These ratings meet or exceed the average CIS Overall Instructor score for both undergrad and grad courses amongst BME We concluded that Dr Zoldan meets or exceeds the expectations of the department with respect to teaching

Dr Zoldan's research productivity in rank was discussed next While in rank, she has published 19 peer-reviewed journal articles, with 10 of these as corresponding author Of these corresponding author papers, 6 are research publications, 2 are invited reviews, one is a methods paper and one is an invited commentary These 19 publications represent over half of her total publications (34) All of her 10 papers included UT-supervised students and/or post-docs as co-authors Her career H-index is 13 (Google Scholar)/11 (ISI) with 950/686 career citations, which meets or exceeds the expectation for promotion to Associate Professor in the field (8-12)

The external letters of evaluation were discussed, and it was pointed out they are all from highly regarded experts in the field The letters were noted to be generally positive, but some commented on her funding levels being lower than what is needed to sustain research productivity in biomaterials/stem cell engineering These comments were often marked with the caveat that Dr Zoldan has many proposals currently pending review, so it was likely that one of the pending proposals would be funded soon

The letter writers included two members of National Academy of Engineering (15a, 15f), one member of NAM (15f), one member of NAI (15a), and four department chairs (15a, 15b, 15e, 15g) Several are from peer public institutions, such as GA Tech, U Minnesota, U Wisconsin, (15c, 15g,15h) and aspirational peer BME programs, such as Rice, MIT, and Johns Hopkins, (15a, 15hf 15d) All are thought leaders in the fields of biomaterials and/or stem cell engineering It was noted that overall the letters were positive and most recommended explicitly in favor of promotion

Dr Zoldan's contributions to advising were noted by the budget council She has supervised 25 UG researchers while in rank, eight of whom have been co-authors on publications She has supervised 2 PhD students and 2 Master's students to completion in rank and currently is mentoring 1 PhD student Her first PhD student is now a Postdoctoral Fellow at Stanford and her second student is a Senior Scientist at United Therapeutics This reflects the career distribution of PhD students in BME in that ~50% go directly to industry positions She also mentored 2 post-doctoral fellows while in rank, one is currently seeking opportunities and the other has taken a position at TCEQ In summary, Dr Zoldan is a good advisor for her mentees and meets expectations for promotion to Associate Professor with respect to advising

During her time in rank, Prof Zoldan took on an appropriate level of service roles in the department including Undergraduate Curriculum Committee, Graduate Admissions Committee, and the Seminar Committee Dr Zoldan's service to the profession has included chairing sessions and serving as Track Chair for the Tissue Engineering Track in 2018 (one of the largest tracks at the meeting with several hundred abstracts submitted) She has also served as Secretary/Treasurer for the Engineering Cells and Their Microenvironments Special Interest Group in the Society for Biomaterials She is on the Scientific Advisory Board for the Tissue Engineering and Regenerative Medicine International Society (TERMIS) World Congress in 2021 She has also served as a reviewer for many funding agencies including AHA, NIH, NASA and NSF, as well as reviewing for 21 different scientific journals Her service exceeds the expectations of the department for promotion to Associate Professor

Dr Zoldan's awards include the American Heart Association (AHA) Scientist in Development Award in 2015 and the Emerging Young Investigator by the Royal Society of Chemistry in 2018 She has been invited to speak at Texas A&M, Rice University, UC Irvine, Tufts, and the University of Rochester Her awards meet the expectations of the department for promotion to Associate Professor

Overall, the BC felt that the case for Prof Zoldan meets the expectations for promotion to Associate Professor in the BME department There was a discussion about whether or not research funding was an important criterion for tenure and promotion and if concerns about

meeting expectations for funding were sufficient to justify not recommending a candidate for tenure Most faculty felt that it was not, relying solely on publications and impact of the work for their assessment of research, and others expressed concerns about the somewhat random nature of the review process In the BC vote on 9/24/19, 12 BC members voted and the final vote was 11 For, 0 Against, 0 Abstain, 1 Absent The Chair's vote in not included in this tally In the subcategories, all votes were yes except for the research category, where there was one No vote Concern about research funding and workload is what drove the one No vote reported in the Research Category This overall vote represents a strong endorsement from the BC for the promotion of Prof Zoldan to Associate Professor

Chair's Assessment

I joined the faculty in BME at UT three years ago, so I have been Chair for the latter half of Dr Zoldan's probationary period Dr Zoldan was hired in September 2013 and received a one-year extension of probationary period by virtue of university policy Dr Zoldan works on understanding the role of physical cues in driving the differentiation human pluripotent stem cells into cardiac tissue and directing its maturation into adult-like tissue These physical cues are under studied in the field of stem cell biology, where much of the effort is focused on using small molecules and protein expression to drive differentiation However, three dimensional cues, clearly play a role in development and disease in humans and could be beneficial for many tissues beyond just the cardiovascular system

These refereed letters are from a group of experts who are known for their depth of thought, mentorship, and innovation in Dr Zoldan's field All of the letter writers commented that they have met Dr Zoldan personally and know her work, which demonstrates that she has made a strong effort to network with senior researchers in her field I include for you below some brief excerpts that I found to be most useful from each letter

Dr Angela Belcher, (MIT – incoming Dept Chair of Biological Engineering)
"She has built a strong research program at the interface between biomaterials, biophysics and stem cell bioengineering to unravel and perturb cell fate and signaling interactions Her pretenure work has set the foundation for understanding and controlling biophysical cues and the cellular microenvironment in cardiac differentiation, and will only continue in their importance and impact in cardiovascular tissue formation"

Dr John Fisher, U Maryland, (Dept Chair)
"I believe that Dr Zoldan has demonstrated excellence in her research efforts, and established a foundation for growth Dr Zoldan has published a number of works in the iPSC field - her work is of high quality Dr Zoldan's ability to secure external funding is likely a concern Mitigating strengths include her graduate student mentorship and service to the university and scientific communities"

Dr Andres Garcia, Georgia Tech
"Dr Zoldan's work is characterized by integration of materials engineering and stem cell biology, careful and thorough analyses, and creativity One notable example is her recent Tissue Engineering Part A paper (Allen et al , 2019) In this elegant work, Dr Zoldan

demonstrated that fiber alignment of biomaterial scaffolds could be exploited to direct human stem cell-derived cardiomyocyte synchronized beating This is a novel and important advance in the field as the investigators were able to decouple cardiomyocyte maturity from synchronized beating"

Dr Sharon Gerecht, Johns Hopkins
"Overall, Janet is an accomplished researcher whose work is innovative and addresses important questions Her research focuses on the use of human iPSCs to model and explore the key processes of cardiac tissue formation Janet's laboratory studies how different aspects of the microenvironment regulate cell differentiation towards the formation of a functioning cardiovascular tissue I find this line of research interesting and Janet is contributing to its advancements"

Dr David Kaplan, Tufts University, (Dept Chair)
"Her studies have spanned fundamental to translational goals, including disease mechanisms, drug testing and tissue regeneration in vivo These studies are highly significant, as we remain very much in the dark on how physical cues, in synergy with biochemical factors, orchestrate cell fate and function, with the cardiac organ as a particularly challenging focus due to the complexity of the system"

Dr Antonios Mikos, Rice University
"An interesting and outstanding aspect of Janet's work is her consistent focus on deciphering the role of physical cues in lineage progression and tissue development and growth with enormous implications in tissue engineering research"

Dr Brenda Ogle, U Minnesota (Dept Chair)
"I believe one of her most substantive works to date was published in Tissue Engineering Part A wherein she studies the impact of extracellular matrix protein density, angiogenic factors, and the relative abundance of remodeling enzymes on vasculogenesis Systematic evaluation of these stimuli to promote the generation of larger scale and thicker engineered cardiac tissue is critical to the field This is a new publication and so has not yet received attention, but will be a valuable resource in the future"

Dr Sean Palecek, U Wisconsin
'In particular, I would like to highlight Prof Zoldan's development of anisotropic materials to study the influence of mechanics on PSC-derived cardiomyocyte maturation and to guide cardiac tissue formation In the heart, cells align to bands that facilitate efficient emptying of the heart chambers during contraction However, in a dish, PSC-derived cardiomyocytes do not organize into higher order structures This body of work has advanced our ability to induce coordinate, tissue-like structure in stem cell-derived cardiomyocytes My lab is currently using a similar approach with a different electrospun scaffold to induce alignment in human iPSC-derived cardiomyocytes based on the work from Dr Zoldan's group"

Dr William Wagner (U Pitt)
'I was impressed with her accomplishments and her vision for moving her work forward to ultimately have clinical impact My own laboratory has some application areas that overlap

with Dr Zoldan and I know that she is carefully working to address many of the key bottlenecks that prevent the successful application of stem cells in the treatment of cardiac muscle loss following myocardial infarction"

Generally, the letter writers are positive about the number of publications and Dr Zoldan's impact on her area of research She is publishing in appropriate journals for the field of biomaterials and stem cell/tissue engineering Several of the reviewers do comment that she did not have any federal funding from sources (at the time the letters of evaluation were solicited in June), such as NIH, NSF, or DOD, although there are several proposals that were listed as pending in the CV that was distributed with the request for letters of evaluation There are also several comments about her funding level being lower than average for the field Since the time of the letter solicitation, she was awarded an NIH R21 Trailblazer grant that more than doubled her funding total They do comment that the AHA is a noteworthy early career grant to an assistant professor in the first four years of their independent career They also note that she has strong mentorship, with 2 PhD students completing their degrees and very strong service to the profession

With respect to her peers, Dr Zoldan's total career citations are in the lower half compared to peers who are up for promotion this year or were promoted in 2019 (Table 1), but not "out of range" with her peers Her H-index is also in the lower half, but H-index at the time of tenure review is largely a function of the citation of one's post-doc and PhD papers Her Google scholar career citations are similar in number to Dr Evan Scott, who was promoted last year at Northwestern (peer BME), and who was considered for hire at the Associate Professor rank last year Dr Scott had more high impact publications from his independent work and significantly more funding Dr Zoldan's H-index is similar to Dr Seidlits who is up for promotion at UCLA this year and is an alum from UT BME Those peers both work in the biomaterials space Dr Ashton (U Wisconsin) also works in stem cell engineering for neural applications He was promoted last year and has higher total citations and H-index but he did have a clock extension of 2 years

Table 1.

Name	Rank	School	PhD Year	Hire Year	Promotion Year	ISI Citations Career	ISI H Index Career	Google Scholar Career	Google Scholar H Index
Janet Zoldan	Asst	Univ of Texas	2004 Technion	2013	2020	686	11	950	13
Dan Alge	Asst	TAMU	2010, Purdue	2014	2020	763	13	1183	18
Randolph Ashton	Asst	Wisconsin	2007, RPI	2011	2019	929	14	1463	18
Emily Day	Asst	UDelaware	2011, Rice	2013	2020	1746	18	2620	16
Greg Hudalla	Assoc	UF	2010, Wisconsin	2014	2019	678	13	867	13
Evan Scott	Assoc	Northwestern	2009 WashU	2012	2019	596	13	925	17
Stephanie Seidlits	Assoc	UCLA	UT, 2010	204	2020	832	12	1275	13

Dr Zoldan has received three research grants in rank totaling $1,030,715 in total costs (candidate's share - $945,052) The first was from the American Heart Association for a Scientist in Development Grant This grant is an Early Career Award for Junior Faculty that is reviewed competitively at the national level The second project was a pilot grant from the Alliance for Regenerative Rehabilitation Research and Training (AR3T) from the University of Pittsburgh (funded by NIH P2CHD086843 to U Pitt) The third project is an NIH Trailblazer R21 from the National Institute of Biomedical Imaging and Bioengineering (NIBIB) The Trailblazer Award is an opportunity for New and Early Stage Investigators (PI's without significant past NIH funding) to pursue high risk, high reward research programs of high interest to the NIBIB that integrate engineering and the physical sciences with the life and behavioral sciences There were ~40 Trailblazer Awards made nationally in FY2019 While this demonstrates some success at garnering extramural funding, there is some concern that this level is not sufficient to sustain the faculty workload for BME of 4 PhD students or post-doctoral researcher that is expected for tenured, research active faculty The salary, fringe and tuition for 4 students is roughly $176,000 per year Faculty who do extensive cell culture or animal research also need sufficient funds to cover experimental studies, which can easily run $2-5k per month Wet lab research with human stem cell, such as the work in Dr Zoldan's lab, is likely to be on the higher end of the supply costs So, a steady state lab needs ~$200-250k/year in direct costs

In my experience with tenure promotion cases as department chair and as a letter writer in the field for many cases, BME faculty generally have somewhere between $1 4M and $3 5M total funding in rank for successful cases This often varies as a function of the amount of funding required for the nature of their research More theoretical labs require less funding and dry labs that have a slower burn rate for supplies However, almost all of the successful candidates have received at least 2 federally funded grants Although she has received one federal award recently, I share the letter writers concerns that Dr Zoldan has found it challenging to obtain federal funding, although the recent awarding of an NIH Trailblazer R21 suggests that Dr Zoldan may be starting to improve her success rate for federal funding

Struggling to get federal funding is fairly normal for junior faculty, however generally with continued mentorship this improves Dr Zoldan has been a participant in the junior faculty writing group that has been running for the last two years in BME However, despite the efforts of at least 6 federally-funded senior faculty in BME (at least 4 of those are squarely in the same field - biomaterials and/or stem cell engineering) to provide mentorship and grant writing guidance, Dr Zoldan has faced continued challenges with federal funding Suggestions about focusing on fewer, stronger proposal that are written over 2-3 months were not implemented, especially in the last year, where a very high number of proposals were submitted in rapid succession I appreciate the sense of concern as the tenure evaluation loomed closer and the element of luck that goes into the selection of reviewers at panels She has had several grant scores that fell just outside the funding range as detailed in the budget council evaluation of her research However, I have some remaining concerns about maintaining a sustainable level of funding that is sufficient to support her laboratory

The Faculty Evaluation Committee of the BME Budget Council presented its final third-review assessment of Dr Zoldan on April 10, 2017 The evaluation and recommendation of the committee is provided below

> "Upon careful evaluation of Dr Zoldan's record in teaching, student supervision, scholarly output, research support, service and external recognition, this Committee concludes that Dr Zoldan meets for third year review productivity set forth by the Biomedical Engineering Department and the Cockrell School of Engineering She has a very good beginning to her faculty career, but she will require a mentor who will help her improve her teaching record She will also need to increase her level of accomplishments in teaching and funding prior to review for tenure "

As department chair at that time, I, concurred with these findings and assessment that Dr Zoldan was meeting expectations of BME and the Cockrell School of Engineering for her career stage at mid-probationary review I gave two specific recommendations in my response memo to address concerns about teaching and research

1) "With regard to her teaching, we reviewed the expectation that candidates demonstrate strong teaching in a core undergraduate course during their probationary period with CIS Average Instructor scores similar to the departmental average of 4 1 Senior faculty are available to mentor her teaching, especially Dr Diller"

2) "In her remaining probationary period, we discussed how she should focus on obtaining federal grant funding for two specific projects from a source such as the NSF, NIH, or DOD with the goal of demonstrating sustainable funding to support her research program at the level of 4 or more PhD students, post-candidacy, at steady-state She should also focus on publication of research from her laboratory to ensure that she has 5 representative publications from her laboratory as senior author for her promotion dossier Senior faculty in biomaterials including Drs Peppas, Sakiyama-Elbert and Suggs should be recruited to review Specific Aims and Grant Proposals well prior to the deadline for submission to get feedback"

In summary, with respect to her teaching and advising, Dr Zoldan is clearly meeting expectations for tenure in BME She has improved her teaching in the last two years and put significant effort into improving her courses Her service at the national level exceeds expectations Her research output meets expectations for publications (as recommended in the mid-probationary review) and her research is clearly visible at a national level as commented on in the letters of evaluation She is an active member on departmental committees The main deficit with respect to expectations for promotion is the concern about the ability to maintain sustainable levels of funding sufficient to support her research program In the Budget Council meeting, the entire committee felt that funding alone should not be the deciding factor for tenure of a colleague that they value and have long standing professional relationships with I also struggle with the weight of this criterion given my knowledge of funding levels required to support her area of research Dr Zoldan may well prove to be successful in her research and in garnering sustainable levels of federal funding in the long run That said, UT Austin policy and procedure limits this review to a very specific window of time for the probationary period and in this case the end of that window falls before there is a full picture of the candidate's research potential However, reservations about her research funding notwithstanding, I believe that Dr Zoldan is a valuable member of the department and the strong support from the budget council has led me to support her promotion to Associate Professor with tenure

COCKRELL SCHOOL OF ENGINEERING
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TO: Dr. Gerald E. Speitel, Jr., Ph.D.
Associate Dean of Academic Affairs,
Cockrell School of Engineering

FROM: Dr. Shelly Sakiyama-Elbert, Ph.D.
Professor & Chair
Department of Biomedical Engineering,
Cockrell School of Engineering

DATE: April 26, 2017

Re: **Third-Year Review of Professor Janet Zoldan**

As Chair of the Department of Biomedical Engineering, I have reviewed the findings of the committee for the third-year review of Dr. Janeta Zoldan. These findings were discussed with Dr. Zoldan on April 26, 2017. With regard to her teaching, we reviewed the expectation that candidates demonstrate strong teaching in a core undergraduate course during their probationary period with CIS Average Instructor scores similar to the departmental average of 4.1. Senior faculty are available to mentor her teaching, especially Dr. Diller. There are also resources available through the Faculty Innovation Center to assist faculty with improving their teaching skills. Dr. Zoldan will also attend the National Effective Teaching Institute Workshop in the Summer 2017.

With respect to research, Dr. Zoldan has one peer reviewed research grant from the American Heart Association. In her remaining probationary period, we discussed how she should focus on obtaining federal grant funding for two specific projects from a source such as the NSF, NIH, or DOD with the goal of demonstrating sustainable funding to support her research program at the level of 4 or more PhD students, post-candidacy, at steady-state. She should also focus on publication of research from her laboratory to ensure that she has 5 representative publications from her laboratory as senior author for her promotion dossier. Senior faculty in biomaterials including Drs. Peppas, Sakiyama-Elbert and Suggs should be recruited to review Specific Aims and Grant Proposals well prior to the deadline for submission to get feedback.

Dr. Zoldan has been active with service to the department, the university and the profession in a career stage appropriate manner. These efforts should continue at a measured level to allow appropriate contributions and visibility but not to level that they distract from her efforts to improve her teaching and continue to build her research program.

COCKRELL SCHOOL OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

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TO: Dr. Shelly Sakiyama-Elbert, Ph.D.
Professor & Chair
Department of Biomedical Engineering
Cockrell School of Engineering

FROM: Department of Biomedical Engineering Third Year Review Committee: Kenneth Diller, George Georgiou and Nicholas A. Peppas (Committee Chair)

DATE: April 3, 2017

Subject: **Third-Year Review of Professor Janet Zoldan**

The Budget Council Committee formed by Department Chair Shelly Sakiyama-Elbert of the Department of Biomedical Engineering has reviewed the third-year progress of Assistant Professor Janet Zoldan. The Committee has carefully considered Dr. Zoldan's professional accomplishments during the past three years as an Assistant Professor and concludes that Professor Zoldan meets the expectations set forth by the Cockrell School of Engineering and The University of Texas at Austin.

Teaching
Here is a summary of Dr. Zoldan's teaching assignments and evaluation.

Sm	Course	Stud	Overall Ins	BME Ins Avg	ChE Ins Avg	Overall Course	BME Course	ChE Course
S17	BME 379/ChE 339T Stem Cells & Tissue Engineering	20	TBD	TBD	TBD	TBD	TBD	TBD
F16	BME 352 Biomaterials	100	3.1	4.1	4.2	3.0	3.8	3.9
S16	BME 382J/377T Stem Cells & Tissue Engineering	22	4.4	4.0	4.2	4.1	3.6	3.9
F15	BME 379 Tissue Engineering	44	3.5	3.9	4.1	3.6	3.6	3.9
S15	BME 382J/377T Stem Cells & Tissue Engineering	10	4.9	4.1	4.2	4.9	3.8	3.9
F14	BME 379/ChE 339T/BME 382J Tissue Engineering	37	3.7	4.0	4.1	3.5	3.7	3.9

Professor Zoldan has taught two undergraduate and one graduate course over a period of six semesters. In Fall 2014 she taught BME 379, "Tissue Engineering", an elective course cross-listed also to Chemical Engineering (ChE 339T). This course can be taken by selected graduate students as a graduate course (BME 382J). She repeated this course in the Spring 2017. Overall evaluation by 37 BME and ChE undergraduate and graduate students with ratings of 3.7 and 3.5. These ratings are somewhat below the

BME teaching average. Many individual comments praised the course and Dr. Zoldan's teaching style. A few comments concentrated on the fact that exams did not seem to follow the teaching material and homework was not related to the exact material covered in the lectures. This is something that can be corrected. Other areas where improvement is needed include availability to students' comments and perhaps reduced adherence to the specifics of the PowerPoint slides during presentations. It is also recommended that Dr. Zoldan arrive to class about 10 minutes before the class starts and interact with the students before and after class.

Professor Zoldan taught a new graduate course she personally developed, BME 382J, Stem Cells: Cells and Tissue Engineering. She taught it twice to 10 and 22 BME and CHE graduate students and had consistently very good to excellent teaching performance with ratings as high as 4.9. In the Fall 2016 she taught her largest class up to now, a required BME course on Biomaterials (BME 352). The performance here was less than desirable with a student rating of 3.1 and a course rating of 3.0. This was Professor Zoldan's initial experience in teaching a large lecture class, and she has room to make improvement. This is an area in which the senior faculty in the department will take special initiative to mentor her to be able to achieve her capability. She is open and receptive to receiving this type of help.

Research & Publication Record: Dr. Zoldan is developing a strong research program in biomaterials with emphasis on induced pluripotent stem cells (iPSCs) and her understating of the role of physical cues in controlling the complex process of iPSC's differentiation. These engineered environments serve as a platform for fundamental research in tissue development, disease mechanisms, drug testing, and hold potential for *in situ* tissue regeneration applications. Dr. Zoldan's research is supported by one grant from the American Heart Association in the amount of $308,000 (July 1, 2015 to June 30, 2019). She is also involved in a multi-University grant from DOD on the formation of a Revolutionary Fibers and Textiles Institute. Overall, during the current evaluation, Dr. Zoldan has submitted four NIH and one NSF proposal and is waiting to hear the scores of these proposals.

Since 2013, Dr. Zoldan has published 6 refereed articles, most of which have appeared in well-regarded journals including *ACS Nano* (IF=13.34), *Nature Cell Biology* (IF=18.70) and *Integrative Biology* (IF=3.371). During the same period, she has also 4 papers that are in preparation and 1 paper under review now.

Dr. Zoldan is also the co-inventor of a US patent (with T. Milner, J. Zoldan, N. Katta, J. Rector) on "Surgical cell, biologics and drug deposition in vivo and real time tissue modification with tomographic guidance".

Advising, Counseling, and Other Student Services: Dr. Zoldan is presently supervising 4 Ph.D. students as the sole supervisor. During the same period, she has also supervised one postdoctoral fellow and one M.S. student. She has had two graduate students who are NSF Fellows, Alysa Joaquin and Alicia Allen. She is currently directing a research group comprising 1 postdoc fellow, 4 PhD students and 6 undergraduate students.

Administrative and Committee Service: In this 3-year period, Dr. Zoldan's service to the Department includes membership in the following committees: Undergraduate Curriculum Committee (2016-), Seminar Series Committee (2016-), Safety Committee (2015-16), Graduate Admissions Committee (2013-14), International Graduate Admissions Committee (2013-) and two faculty search committees. She has served on 11 qualifying exam committees and was the Chair of seven of them. She also served on 10 dissertation committees. On a National level, she is active in BMES and has chaired sessions at its annual meeting. In addition, she has been an active reviewer of grants for the Genome British

Columbia's Strategic Opportunities Fund, the American Heart Association and the Israeli Ministry of Science, Technology and Space.

Honors and Awards: Professor Zoldan has been honored as a 2017 Emerging Investigator by the RSC journal "Biomaterials Science" and her research will be featured in a special issue of the journal. In addition, she has been selected to represent UT at the National Effective Teaching Institute Workshop in the summer 2017.

Overall Assessment: Upon careful evaluation of Dr. Zoldan's record in teaching, student supervision, scholarly output, research support, service and external recognition, this Committee concludes that Dr. Zoldan meets for third year review productivity set forth by the Biomedical Engineering Department and the Cockrell School of Engineering. She has a very good beginning to her faculty career, but she will require a mentor who will help her improve her teaching record. She will also need to increase her level of accomplishments in teaching and funding prior to review for tenure. This assessment agrees with her average annual evaluation by the BME Budget Council, a score of 2.0 out of 3.0.

THE UNIVERSITY OF TEXAS AT AUSTIN
Cockrell School of Engineering
Standard Resume

FULL NAME: Janeta Zoldan **TITLE:** Assistant Professor

DEPARTMENT: Biomedical Engineering

EDUCATION

Hebrew University, Jerusalem, Israel	Chemistry	B Sc	Jun 1995
Technion, Israel Institute of Technology, Haifa, Israel	Materials Engineering	M Sc	Jun 1999
Technion, Israel Institute of Technology, Haifa, Israel	Materials Engineering	Ph D	Aug 2004

CURRENT AND PREVIOUS ACADEMIC POSITIONS

University of Texas at Austin	Assistant Professor	Aug 2013-Present
MIT, Dept of Chemical Engineering, Koch Institute for Integrative Cancer Research	Founder and Director of Nanotechnology Core Facility	Sep 2012-August 2013
MIT, Dept of Chemical Engineering, Koch Institute for Integrative Cancer Research, Dr Robert Langer Laboratory	Research Associate	Feb 2011-Sept 2012
MIT, Dept of Chemical Engineering, Koch Institute for Integrative Cancer Research, Dr Robert Langer Laboratory	Postdoctoral Fellow	Feb 2007-Jan 2011

OTHER PROFESSIONAL EXPERIENCE

Technion, Israel Institute of Technology, Faculty of Biomedical Engineering, Dr Shulamit Levenberg	Postdoctoral Fellow	Oct 2004- Dec 2006
Technion, Israel Institute of Technology, Faculty of Materials Engineering, Dr Arnon Siegmann	Teaching Assistant (as a Ph D student)	Oct 2000 - Aug 2004
Technion, Israel Institute of Technology, Faculty of Materials Engineering, Dr Arnon Siegmann	Research Engineer	Jun 1999 - Oct 2000
Technion, Israel Institute of Technology, Faculty of Materials Engineering, Dr Arnon Siegmann	Teaching Assistant (as a MS student)	Oct 1996 – Jun 1999

MAJOR CONSULTING PROJECTS

- Scientific Advisory Board, member, Biolife4D, Buffalo Grove, IL, 06/2017- Present
- MicroCHIPS Inc , consultant, Bedford, MA, 06/2009 – 06/2010

HONORS AND AWARDS

Prior to joining UT Austin

- Recipient of the Excellence in Teaching Award, Technion Israel Institute of Technology, 1997
- Recipient of the Continuous Excellence in Teaching Award, Technion Israel Institute of Technology, 1999
- Recipient of the Mirriam and Aaron Gutwirth Fellowship for excellence in research, Technion Israel Institute of Technology, 1999
- Recipient of the Research Excellence Scholarship, Technion Israel Institute of Technology, 2000
- Recipient of the Katz Family Award for Outstanding Excellence in Teaching, Technion Israel Institute of Technology, 2002 (Created to recognize exceptional teaching observed on multiple years Dr Zoldan was the first recipient for teaching from 1997-2002)
- Nominated as the Aly-Kaufman Postdoctoral Fellow, Technion Israel Institute of Technology, 2004-2006
- Recipient of the Technion Postdoctoral Fellowship for Outstanding Women Scientists in Engineering, 2006
- Recipient of the Children's Glaucoma Fellowship, 2007
- Recipient of the Outstanding Mentoring of Undergraduate Research, Massachusetts Institute of Technology, 2012

In Rank

- Selected by Cockrell School of Engineering to represent UT for the Searle Scholarship Program, 2014
- Awarded the Scientist Development Grant, national award from the American Heart Association, 2015
- Invited to present my research at the American Heart Association headquarters, 2017
- Selected by the Cockrell School of Engineering to represent UT at the National Effective Teaching Institute workshop, 2017
- Selected by *Biomaterials Science* as 2017 Emerging Young Investigator, The Royal Society of Chemistry, 2017
- Invited to write a commentary in *Cell Stem Cells* (Impact Factor 23), 2018
- Invited to write a review on extracellular matrix-like biomaterials in *Regenerative Biomaterials*, 2018.
- Invited to write a review on cardiac maturation in *Trends in Molecular Medicine* (Impact Factor 11), 2018
- Awarded the pilot grant from the Alliance of Regenerative Rehabilitation Research and Training and selected as part of the Cardiovascular Research Core, 2018
- Selected as a member of the Scientific Advisory Board for the Tissue Engineering and Regenerative Medicine International Society World Congress, 2019
- Our work was selected to be part of a Special Issue on Engineered Tissues Derived from Induced-Pluripotent Stem Cells (iPSCs) for Disease Modeling, Drug Discovery, and Replacement Therapies in *Tissue Engineering*, 2019
- Invited to present our research at the 8th International Conference on Bioengineering and Nanotechnology, Society for Biological Engineering, 2019
- Elected, Secretary-Treasurer in the Engineering Cells and Their Microenvironments, Special Interest Group, Society of Biomaterials, 2019

MEMBERSHIPS IN PROFESSIONAL AND HONORARY SOCIETIES

- International Society for Stem Cell Research (ISSCR), 2006-Present
- American Heart Association (AHA), 2010-Present
- Biomedical Engineering Society (BMES), 2010-Present
- American Society for Engineering Education (ASEE), 2018-Present
- Society of Biomaterials (SFB), 2017-Present

UNIVERSITY COMMITTEE ASSIGNMENTS

Departmental

- Undergraduate Student Advising 2013-Present
- Member, Graduate Admissions Committee 2014-2016
- Member, International Graduate Admissions Committee 2013-2015
- Founder, seminar series "The Doctor is in the House" 2013-Present
- Member, the search committee for Identifying Young Full Professor 2014-2015
- Member, the search committee for a new BME building manager 2015
- Member, Safety Committee 2015-2016
- Member, Seminar Series Committee 2016-Present
- Member, Undergraduate Curriculum Committee 2016-Present

Cockrell School of Engineering

- Reviewed applications for the National Institutes of Health, National Cancer Institute Predoctoral to Postdoctoral Fellow Transition Award (F99/K00), Internal Competition 2018
- Participated in Research Careers in Industry and Academia Panel Discussion in Graduates Linked with Undergraduates in Engineering (GLUE) Undergraduate Research 2018
- Participated in Early Career Awards Panel Discussion 2018

University

- Review applications for Undergraduate Fellowships biannually 2013-Present
- Reviewed applications for the Rita Allen Foundation Scholars Program 2017
- Served on the Advisory Committee for the Mouse Genetic Engineering Facility 2019

PROFESSIONAL SOCIETY/GOVERNMENT SERVICE AND TECHNICAL COMMITTEES

Professional Society Committees

- Biomedical Engineering Society (BMES) – Reviewed abstracts and chaired two sessions at the annual meeting in San Antonio, TX, 2014
- BMES – Reviewed abstracts for the annual meeting in Tampa, FL, 2015
- BMES – Reviewed abstracts and chaired one session at the annual meeting in Minneapolis, MN, 2016
- BMES – Reviewed abstracts and chaired one session at the annual meeting in Phoenix, AZ, 2017
- BMES – Track Chair, Tissue Engineering Track for the annual meeting in Atlanta, GE, 2018
- Society of Biomaterials (SFB) – Finance Committee member, 2018
- SFB – Reviewed abstracts, chaired one session and judged poster session at the annual meeting in Seattle, WA, 2019
- SFB –Secretary Treasurer in the Engineering Cells and Their Microenvironments, Special Interest Group, 2019
- Tissue Engineering and Regenerative Medicine International Society (TERMIS) – Member of the Scientific Advisory Board for the next world TERMIS congress in Maastricht Nederland, 2021
- 2nd International Conference on Bioengineering and Nanotechnology, chaired one session, Baltimore, MD, 2019

Grant Review Committees

- Genome British Columbia's Strategic Opportunities Fund, 2014
- American Heart Association's Reviews, 2015-present
- Israeli Ministry of Science, Technology, and Space, 2016-present

- National Institutes of Health (NIH), National Institute of Biomedical Imaging and Bioengineering (NIBIB) Career Development (K) and Conference (R13) award applications review panel, 2017
- The National Aeronautics and Space Administration (NASA), Cellular & Molecular Biology review panel, 2018
- NASA, Space Biology, Cell, and Molecular Biology review panel, 2018
- NIH, Cardiovascular Differentiation and Development (CDD) review panel, 2018
- NIH, NIBIB Career development (K) and Conference (R13) award application review panel, 2019
- National Science Foundation (NSF), Disability and Rehabilitation Engineering (DARE)- Engineering Biomedical Systems (EBMS) combined review panels, 2019

COMMUNITY ACTIVITIES

- Judged at the BMES UT Austin chapter case competition 11/2014
- Judged 6th graders' science projects at the Lee Elementary science fair 01/2015
- Participated in Faculty panel discussion on envisioning obstacles as opportunities for the Society of Women Engineers 03/2015
- Participated in the luncheon for the Society of Women Engineers 03/2015
- Participated in the Women in Biomedical Engineering (WBME) luncheon 04/2015
- Judged at the BME Undergraduate Research Poster Competition 05/2015
- Participated in the Woman in Engineering Program (WEP) faculty/student social 10/2015
- Participated in the WBME breakfast with faculty 11/2015
- Explore UT, organized lab-based activities to showcase our research to the general community 03/2016
- Participated in the WBME annual luncheon 04/2016
- Judged at the BME Undergraduate Research Poster Competition 05/2016
- Participated in a faculty panel discussion on finding a work/life balance for SWE, 09/2016
- Judged in the regional Siemens Science Fair 11/2016
- Gave a talk at the headquarters of American Heart Association at Austin 01/2017
- Judged 4th graders' science projects at the Lee Elementary science fair 01/2017
- Explore UT, organized lab-based activities to showcase our research to the general community 03/2017
- Participated in the WBME annual luncheon 04/2017
- Participated in the WEP faculty/student social 10/2017
- Judged in the regional Siemens Science Fair 11/2017
- Judged students' posters in the 1st UT BME Student Retreat 08/2018
- Participated in the Woman in the WEP faculty/student social 10/2018
- Participated in a panel discussion on research careers in GLUE Undergraduate Research Course 11/2018
- Participated in Early Career Awards Panel Discussion 11/2018
- Participated in the WBME annual luncheon 04/2019
- Judged at the BME Undergraduate Research Poster Competition 05/2019

RESEARCH SYNOPSIS

My research program at The University of Texas at Austin is at the intersection of material science and stem cell bioengineering. Using human induced pluripotent stem cells (iPSCs) as a model system to explore key principles underlying cardiovascular tissue formation processes, we aim to control cell fate with material design to treat cardiovascular disease. Toward this goal, we design three dimensional (3D) matrixes that present cells with a myriad of controllable signals. In comparison to a traditional 2D tissue culture surface, this engineered cellular microenvironment is substantially more representative of the natural setting in which tissue development takes place. Specifically, these matrixes utilize engineered biomaterials with tunable physical, chemical, and biological properties, providing a range of control signals. Utilizing these tools, my research program is centered around two specific goals: (i) **deciphering the role of physical cues in the complex process of iPSCs differentiation into cardiovascular lineages,** and (ii) **developing microenvironments favorable for cardiovascular tissue formation.** These engineered environments provide a platform for fundamental research in tissue development, investigation

of disease mechanisms, testing of drugs, and the development of solutions for *in situ* tissue regeneration. The research outlined in the following paragraphs has been supported by the Scientist Development Grant awarded from the American Heart Association and the Alliance of Regenerative Rehabilitation Research and Training award.

The role of physical cues in cardiac differentiation. Despite great advancements in cardiac differentiation in the past two decades, it remains a challenge to produce functionally mature cardiomyocytes that can integrate with host tissue. My group's effort in this area has focused on generating a cardiac syncytium – a cardiac tissue in which cells are electromechanically coupled, enabling them to function as a single unit. A key feature of cardiac tissue that enables this syncytium is cell alignment, allowing contraction and propagation of signals in one direction. We first set out to incorporate anisotropic cues into the cardiac differentiation microenvironment. Utilizing electrospinning processes, we controlled matrix anisotropy and generated fiber scaffolds with a range of degrees of orientation to decipher how and when cells respond to microenvironment anisotropy. Our results with cardiac differentiation on aligned fiber scaffolds demonstrated that matrix induced cellular alignment can be used to improve synchronized cardiomyocyte beating (Allen and Zoldan, *Tissue Engineering Part A*, 2019). To our knowledge, this is the first demonstration that cardiac cell maturity can be decoupled from synchronized beating. We are currently investigating the mechanisms that lead to synchronized beating, looking into the role of cell-cell and cell-matrix interactions by identifying adhesion proteins and perturbing cell-cell communication. To further develop the concept of a cardiac syncytium, we introduced alignment into cell sheets. We developed an electrospinning modality to generate Poly(N-isopropylacrylamide) based fiber scaffolds as a straight-forward and reliable means of producing anisotropic, thermo-sensitive surfaces that allow non-enzymatic cell sheet detachment. This is preferable for cardiac cells, as cell structure and cell-cell adhesions that mediate cell communication are preserved (Allen and Zoldan, *Biomaterials Science*, 2017, *Biomaterials Science*, 2017 Emerging Young Investigator, US Patent App. 15/883,963). We have developed the first myocardial infarction model at UT Austin and are currently testing the ability of aligned synchronized beating cardiac sheet to improve coupling with the host myocardium. As the aforementioned cardiac tissue is immature, to induce their maturation, we have taken a different, yet promising, approach - modulating the redox state of differentiating cardiomyocytes. Redox signaling, in which reactive oxygen species (ROS) modulate chemical pathways by electron transfer, plays a critical role in regulating stem cell cardiac differentiation. We have shown that selectively targeting certain types of ROS, such as mitochondrial ROS, may substantially promote cardiac maturation (Tu and Zoldan, *Cell Research*, 2018). This report has also led to an invited opinion paper detailing the involvement of ROS in nearly all aspects of cardiac maturity (Momtahan and Zoldan, *Trends in Molecular Medicine* 2019). Our footprint in the cardiac field has led to an invited commentary from the journal of *Cell Stem Cells* (Tu and Zoldan, *Cell Stem Cells* 2018).

Microenvironments favorable for cardiovascular tissue formation. A functional vascular system is essential for the formation and maintenance of most tissues in the body, and the lack of vascularization results in ischemic tissues with limited intrinsic regeneration capacity. Thus, future challenges in the field of iPSCs-derived cardiac tissue engineering are the construction of thick and vascularized tissue structures. Towards this aim, I focus on the development of extracellular matrix mimicking biomaterials that can encapsulate iPSC-derived vascular progenitor cells (iPSC-VPCs) and guide their assembly into mature, functional blood vessels. This platform system of controlled tissue engineered neovascularization serves concurrently for both basic and applied studies. We developed a novel assay that encourages the formation of a 3D, lumenized primitive capillary plexus derived from iPSC-VPCs in collagen and collagen hydrogels over extended culture times. We found that vasculogenic potential of iPSC-VPCs is regulated by cell-matrix interactions and the matrix properties of collagen hydrogels (Crosby and Zoldan, *Tissue Engineering Part A*, 2019, Selected for a special issue on Engineered Tissues Derived From IPSCs For Disease Modeling, Drug Discovery, And Replacement Therapies). Additionally, we developed a computational pipeline that can quantify the developing vascular plexus in three dimensions. This computational pipeline is user biased-free, and the code is accessible to the scientific community, allowing each user to adjust it to fit their specific requirements. The development of the computational pipeline and its publication (Crosby and Zoldan, *JoVE*, 2019) has spurred collaborations with many groups across the US. We recently were invited to write a review paper on angiogenetic biomaterials (Crosby and Zoldan, *Regenerative Biomaterials*, 2019).

The novelty of my research program lies in its potential to elucidate the mechanisms that transform physical cues into biological signals and the molecular pathways by which these cues control lineage commitment. Most

importantly, my work is revealing how cell-matrix and cell-cell interactions lead to changes in cell behavior and cellular organization in tissues. Through an understanding of the cues that drive stem cell fate, it may be possible to incorporate relevant cues into the design of future 3D microenvironments to optimize and facilitate tissue repair and regeneration. These accomplishments will pave the way for establishing structure-function relationships between cells and tissues. Descriptive models coupling biophysical cues to achieve a phenotype are needed to drive the field of tissue engineering to the next step of engineering complex tissue structures for *in vivo* transplantation.

PUBLICATIONS

Members of the Zoldan laboratory are underlined. Postdoctoral fellows are double underlined.

A. Refereed Journal Papers

Prior to Joining UT Austin

1. I. Fisher, J. Zoldan, A. Siegmann, and M. Narkis, "Interface modification and characterization in three-component polymer blends", *Polymer Composites*, 21(3), p. 476-491. DOI 10.1002/pc.10203 (June 2000)
2. J. Zoldan, A. Siegmann, and M. Narkis, "Encapsulation during melt processing of ternary immisciable polymer blends", *Journal of Polymer Engineering*, 23(2), p. 119-146. DOI: 10.1515/POLYENG.2003.23.2.119 (March 2003)
3. J. Zoldan, A. Siegmann and M. Narkis, "*In-situ* fibrillation of Ny6/6 during processing of PP/Ny6/6 blends, slightly below the Ny6/6 melting temperature", *Journal of Macromolecular Science, Part B: Physics*, 44(4), p. 495-515. DOI 10.1081/MB-200064792 (July 2005)
4. J. Zoldan, A. Siegmann, and M. Narkis, "Dielectric spectroscopy of anisotropic carbon black containing polypropylene/nylon-66 blends", *Journal of Macromolecular Science, Part B: Physics*, 45(1), p. 61-83. DOI 10.1080/00222340500407889 (January 2006)
5. J. Zoldan and S. Levenebrg, "Engineering three-dimensional tissue structures using stem cells", Methods in Enzymology, 420, p. 381-391. DOI: 10.1016/S0076-689(06)20018-1 (January 2006)
6. J. Zoldan, A. Siegmann, and M. Narkis, "Anisotropy in the structure and electrical resistance of PP/NY/CB blends processed below the melting temperature of NY", *Journal of Polymer Engineering and Science*, 46(9), p. 1250-1262. DOI 10.1002/pen.20594 (July 2006)
7. J. Zoldan, A. Siegmann, and M. Narkis, "Polypropylene/nylon-66/carbon black Blends processed at temperatures just below the nylon melting: anisotropy in structure and properties", *Macromolecular Symposia*, 233(1), p. 123-131. DOI: 10.1002/masy.200690008 (March 2006)
8. S. Levenberg, J. Zoldan, Y. Basevitch and R. Langer, "Endothelial potential of human embryonic stem cells", *Blood*, 110(3), p. 806-814. DOI: 10.1182/blood-2006-08-019190 (August 2007)
9. Y. Lumelsky, J. Zoldan, S. Levenberg, and M. Silverstein, "Porous polycaprolactone-polystyrene semi-interpenetrating polymer networks synthesized within high internal phase emulsions", *Macromolecules*, 41(4), p. 1469-1474. DOI: 10.1021/ma7027177 (February 2008)
10. M. Levy-Mishali, J. Zoldan, and S. Levenberg, "Effect of scaffold stiffness on myoblast differentiation", *Tissue Engineering Part A*, 15(4), p. 935-944. DOI: 10.1089/ten.tea.2008.0111 (April 2009)
11. J. Zoldan, E. D. Karagiannis, C.Y. Lee, D.G. Anderson, R. Langer, and S. Levenberg, "The influence of scaffold elasticity on germ layer specification of human embryonic stem cells", *Biomaterials*, 32(36), p. 9612-9621. DOI: 10.1016/j.biomaterials.2011.09.012 (December 2011)
12. J. Zoldan, A. Lytton-Jean, E. D. Karagiannis, K. Deiorio-Haggar, L. Bellan, R. Langer, and D.G. Anderson, "Directing human embryonic stem cell differentiation by non-viral delivery of siRNA in 3D culture", *Biomaterials*, 32(31), p. 7793-7800. DOI: 10.1016/j.biomaterials.2011.06.057 (November 2011)
13. I. Shichor, N. Shomron, M.W. Lawlor, S.A. Bae, J. Zoldan, R. Langer, and D.S. Kohane, "Toxicogenomic analysis of a sustained release local anesthetic delivery system", *Biomaterials*, 33(13), p. 3586-3593. DOI: 10.1016/j.biomaterials.2012.01.043n (May 2012)

14 A Sharei[†], J Zoldan[†], A Adamo[†] W-Y Sim, N Cho, E Jackson, S Mao, S Schneider, M-J Han, A Lytton-Jean, P A Basto, S Jhunjhunwala, J Lee, D A Heller, J-W Kang, G C Hartoularos, K-S Kim, D G Anderson, R Langer, and K F Jensen, "A vector-free microfluidic platform for intracellular delivery", *Proceedings of the National Academy of Sciences of the United States of America*, 110(6), p 2082-2087 DOI 10 1073/pnas 1218705110 (May 2012) [†]Equal contribution

In Rank

15 A Sharei, N Cho, S Mao, E Jackson, R Poceviciute, A Adamo, J Zoldan, R Langer, K F Jensen, "Cell squeezing as a robust, microfluidic intracellular delivery platform", *Journal of Visual Experiments*, 7(81), e50980 DOI 10 3791/50980 (November 2013)

16 C Tu, S Das, A B Baker, J Zoldan*, and L J Suggs*, "Nanoscale strategies-treatment for peripheral vascular disease and critical limb ischemia", *ACS Nano*, 9(4), p 3436-3452 DOI 10 1021/nn507269g (April 2015) **Corresponding authors*

17 C Tu, L Santo, Y Mishima, N Raje, Z Smilansky, J Zoldan*, "Monitoring protein synthesis in single live cancer cells", *Integrative Biology*, 8(5), p 645-653 DOI 10 1039/c5ib00279f (April 2015) **Corresponding author*

18 K Baek, C Tu, J Zoldan, L J Suggs, "Gene transfection for stem cell therapy", *Current Stem Cell Reports*, 2(1), p 52-61 DOI 10 1007/s40778-016-0029-5 (March 2016)

19 N Dana, R A Fowler, A Allen, J Zoldan, L J Suggs, S Emelianov, "In vitro photoacoustic sensing of calcium dynamics with arsenazo III", *Laser Physics Letters*, 13(7), e075603 DOI 10 1088/1612-2011/13/7/075603 (June 2016)

20 N Katta, J A Rector, M R Gardner, A E McElroy, K C Choy, C O Crosby, J Zoldan and T E Milner, "Image-guided smart laser system for precision implantation of cells in cartilage", *SPIE Medical Imaging* DOI 10 1117/12 2253812 (March 2017)

21 Y Liu, A Nguyen, A Allen, J Zoldan, Y Huang, J Y Chen, "Regenerated cellulose micro-nano fiber matrices for transdermal drug release", *Materials Science and Engineering C*, 74, p 485-492 DOI 10 1016/j msec 2016 12 048 (May 2017)

22 Y Cha, M-J Han, H-J Cha, J Zoldan, A Burkart, J H Jung, Y Jang, C-H Kim, H-C Jeong, B G Kim, R Langer, C R Kahn, L Guarente, and K-S Kim, "Metabolic control of primed human pluripotent stem cell fate and function by the miR-200c-SIRT2 axis", *Nature Cell Biology*, 19(5), p 445-456 DOI 10 1038/ncb3517 (May 2017)

23 A Allen, E Barone, C O Crosby, L J Suggs, J Zoldan*, "Electrospun poly (N-isopropyl acrylamide)/poly (caprolactone) fibers for the generation of anisotropic cell sheets", *Biomaterials Science*, 5(8), p 1661-1669 DOI 10 1039/c7bm00324b (July 2017) **Corresponding author*

24 C Tu, R Xu, M Koleti, J Zoldan*, "Glycogen synthase kinase-3 inhibition sensitizes human induced pluripotent stem cells to thiol-containing antioxidants induced apoptosis", *Stem Cell Research*, 23, p 182-187 DOI 10 1016/j scr 2017 07 019 (August 2017) **Corresponding author*

25 S Aday, J Zoldan, M Besnier, L Carreto, J Saif, R Fernandes, T Santos, L Bernardino, R Langer, C Emanueli and L Ferreira, "Synthetic micropartides conjugated with VEGF165 improve the survival of endothelial progenitor cells via microRNA-17 inhibition", Nature Communications, 8(1), p 747-761 DOI 10 1038/s41467-017-00746-7 (September 2017)

26 A K Gadok, C Zhao, A Meriwether, S Ferrati, T Rowley, J Zoldan, H D C Smyth, J C Stachowiak, "Display of single-domain antibodies on the surfaces of connectosomes enables gap junction-mediated drug delivery to specific cell populations", *Biochemistry*, 57(1), p 81-90 DOI 10 1021/acs biochem 7b00688 (September 2017)

27 C Tu, A Allen, W Deng, O Conroy, M Nambiar, J Zoldan*, "Commonly used thiol-containing antioxidants reduce cardiac differentiation and alter gene expression ratios of sarcomeric isoforms", *Experimental Cell Research*, 370(1), p 150-159 DOI 10 1016/j yexcr 2018 06 017 (June 2018) **Corresponding author*

28 C Tu and J Zoldan*, "Moving iPSC-derived cardiomyocytes forward to treat myocardial infarction", *Cell Stem Cells*, 23(3), p 322-323 DOI 10 1016/j stem 2018 08 011 (September 2018) *Corresponding Author

29 C O Crosby, D Valliappan, D Shu, S Kumar, C Tu, W Deng, S H Parekh, J Zoldan*, "Quantifying the vasculogenic potential of iPSC-derived endothelial progenitors in collagen hydrogels", Special Issue on Engineered Tissues Derived from Induced-Pluripotent Stem Cells (iPSCs) for Disease Modeling, Drug Discovery, and Replacement Therapies, *Tissue Engineering, Part A* DOI 10 1089/ten TEA 2018 0274, Epub ahead of print (January 2019) *Corresponding author

30 C O Crosby and J Zoldan*, "Mimicking the physical cues of the ECM in angiogenic biomaterials", *Regenerative Biomaterials*, 6(2), p 61-73 DOI 10 1093/rb/rbz003 (February 2019) *Corresponding author

31 C O Crosby and J Zoldan*, "A novel in vitro 3D model and computational pipeline to quantify the vasculogenic potential of iPSC-derived endothelial progenitors", *Journal of Visual Experiments*, 147, e59342 DOI 10 3791/59342 (May 2019) *Corresponding author

32 A Allen, E Barone, N Momtahan, C O Crosby, C Tu, W Deng, K Polansky, J Zoldan*, "Temporal impact of substrate anisotropy on differentiating cardiomyocyte alignment and functionality", Tissue Engineering, Part A https //doi org/10 1089/ten TEA 2018 0258, Epub ahead of print (February 2019) *Corresponding author

33 W Goth, S Potter, A Allen, J Zoldan, M S Sacks, J W Tunnell, "Non-destructive reflectance mapping of collagen fiber alignment in multi-layered tissues", Annals of Biomedical Engineering, 47(5), p 1250-1264 DOI 10 1007/s10439-019-02233-0 (May 2019) Featured on the May cover

34 N Momtahan, C O Crosby, and J Zoldan* "The role of reactive oxygen species in in-vitro cardiac maturation", Trends in Molecular Medicine DOI 10 1016/j molmed 2019 04 005, Epub ahead of time (May 2019) *Corresponding Author

35 N Momtahan, W Deng, C O Crosby and J Zoldan*, "CHIR99021 and retinoic acid are sufficient to drive robust epicardial differentiation from human pluripotent stem cells" In Preparation *Corresponding Author

B. Refereed Conference Proceedings

Prior to Joining UT Austin

1 Y Lumelsky, J Zoldan, S Levenberg, M S Silverstein, "Porous materials containing biodegradable polymers High internal phase emulsion synthesis", *Abstracts of Papers of The American Chemical Society* (ACS), 234 (August 2007)

2 J Zoldan, "Engineering the stem cell microenvironment", Scientific Track Abstracts of the International Conference on Tissue Science and Engineering, *Journal of Tissue Science & Engineering* DOI 10 4172/2157-7552-S1 002 (October 2012)

3 E D Karagiannis, J Zoldan, R Langer, D G Anderson, "Rational approaches to direct human embryonic stem cell differentiation", *American Society of Mechanical Engineering*, Nanoengineering for medicine and Biology (February 2013)

In Rank

4 S Aday, J Zoldan, L Carreto, T Santos, L Bernardino, J Malva, R Langer, L Ferreira, "VEGF165-bound beads modulate endothelial cell survival and microRNA expression", *Journal of Tissue Engineering and Regenerative Medicine*, 8, 191-192 (June 2014)

5 A Joaquin, N Peppas, J Zoldan, "Hydrogel polymer library for developing induced pluripotent stem cell-derived cardiac patches", *Tissue Engineering Part A*, 20, S55-S55 (November 2014)

6 S Aday, M Besnier, J Zoldan, J Saif, T Santos, L Carreto, L Bernardino, R Langer, C Emanueli, L Ferreira, "MicroRNA 17 in angiogenesis lessons learned from immobilized vascular endothelial growth factor", *Circulation Research*, 117 (Suppl 1), A10-A10 (July 2015)

7 S Aday, M Besnier, J Zoldan, L Carreto, J Saif, R Langer, C Emanueli, L Ferreira, "198 microRNA-17 as the target of immobilized vascular endothelial growth factor in endothelial cell survival under ischemic conditions", *Heart*, 102 (Suppl 6), A133-A134 (June 2016)

8. N Katta, J A Rector, M R Gardner, A E McElroy, K C Choy, C O Crosby, J Zoldan and T E Milner, "Image-guided smart laser system for precision implantation of cells in cartilage" *SPIE Medical Imaging* (February 2017)

C. Other Publications

1 J Zoldan and S Levenberg, "Human stem cell research in Israel the scientific, ethical and regulatory network", *Journal of Bioiaw and Bussiness*, 10(3) p 20-24 (July 2007)

2 J Zoldan, Foreword to "Biomaterials Science an integrated clinical and engineering approach", edited by Yitzhak Rosen and Noel Elman, CRC Press (June 2012)

D. Books, Chapters of Books; Editor of Books

1 J Zoldan and S Levenberg, "Engineering three-dimensional tissue structures using stem cells" Methods in Enzymology Stem Cells Volume, edited by R Lanza and I Kilmanskaya, Elsevier, 420, 381 (January 2006)

2 J Zoldan, T Kraehenbuehl, A Lytton-Jean, R Langer, D G Anderson, "Tissue engineering for stem cell-mediated regenerative medicine" "Human stem cell technology and biology a research guide and laboratory manual", section V Application of human embryonic stem cells, edited by G S Stein, M Borowski, M X Loung, M-J Shi, K P Smith, and P Vazquez, 377 (November 2010)

Journal Peer Review

- Acta Biomaterialia
- Bioengineering and Biotechnology
- Biomaterials
- Biomaterials Science
- Cell Stem Cells
- Integrative Biology
- Journal of Biomedical Materials Research
- Journal of Controlled Release
- Journal of Materials Chemistry
- Journal of Visual Experiments
- Materials Science and Engineering
- Nature Communications
- Pediatric Research
- PLOS ONE
- Regenerative Biomaterials
- Science Advances
- Scientific Reports
- Stem Cell Reports
- Stem Cells
- Tissue Engineering
- Trends in Biotechnology

G. Media Highlights

- Commentary articles on our paper titled "A vector-free microfluidic platform for intracellular delivery" appeared in
  - **MIT News** (http://news.mit.edu/2013/putting-the-squeeze-on-cells-0128)
  - **Nature** (https://www.nature.com/articles/493581e)
  - **Phys.org** (https://phys.org/news/2013-01-deforming-cells-rna-proteins-nanoparticles.html)

- **New Scientist** (http://www.newscientist.com/blogs/shortsharpscience/2013/01/cell-membrane.html)
- **BioTechniques** (http://www.biotechniques.com/news/Squeezing-Cells-to-Deliver-Large-Molecules/biotechniques-339415.html - .VQCr1r_eGnh)
- **Science Daily** (https://www.sciencedaily.com/releases/2013/01/130123133717.htm)

- Dr Zoldan's talk at the RegenMED Conference in San Antonio was highlighted in **GenCure** (https://gencure.org/news/regenmed-sa-shows-potential-regions-regenerative-medicine-industry)
- Our review paper titled "Mimicking the physical cues of the ECM in angiogenic biomaterials" was chosen as a featured article in *Regenerative Biomaterials* (https://academic.oup.com/rb/issue)
- Our review paper titled "The role of reactive oxygen species in in-vitro cardiac maturation" was highlighted by Muscle Cell News (https://twitter.com/musclecellnews/status/1127691537925763072) and in *Trends in Molecular Medicine* (https://twitter.com/TrendsMolecMed/status/1126889182002872320)
- Our paper titled "A novel in vitro 3D model and computational pipeline to quantify the vasculogenic potential of iPSC-derived endothelial progenitors" was highlighted by ***JoVE***, **JoVE Editorial** (https://twitter.com/JoVEJournal/status/1129553939792809872), and **JoVE Japan** (https://twitter.com/JoVE_Japan/status/1129085586490872097)
- Our paper titled "Quantifying the vasculogenic potential of iPSC-derived endothelial progenitors in collagen hydrogels" was highlighted as part of a special issue in *Tissue Engineering* (https://www.liebertpub.com/doi/full/10.1089/ten.tea.2019.0118)
- Our paper titled "Non-destructive reflectance mapping of collagen fiber alignment in multi-layered tissues" is featured on the May cover of *Annals of Biomedical Engineering*

ORAL PRESENTATIONS

Invited Lectures Prior to Joining UT Austin

1 J Zoldan, "Property anisotropy in polypropylene (PP)/ nylon (NY)/ carbon black (CB) blends, processed below the NY melting" Materials Seminars, Department of Solid Mechanics, Materials and Systems, Tel-Aviv University, Tel-Aviv, Israel (April 2006)

2 J Zoldan, "Engineering the stem cell microenvironment", The International Conference on Tissue Science and Engineering, Chicago, IL (October 2012)

3 J Zoldan, "Microenvironments for stem cell differentiation and induced pluripotent stem cell generation", Department of Biomedical Engineering, University of Texas at Austin, Austin, TX (January 2013)

4 J Zoldan, "Microenvironments for stem cell differentiation and induced pluripotent stem cell generation", Joint Department of Biomedical Engineering, University of North Carolina Chapel Hill and North Carolina State University, Chapel Hill and Raleigh, NC (March 2013)

5 J Zoldan and A Sharei, "Microfluidic and materials approach to determining cell fate", Experimental Biology (EB2013), American Society for Pharmacology and Experimental Therapeutics, Boston, MA (April 2013)

Invited Lectures In Rank

6 J Zoldan, "Engineering the differentiation of human pluripotent stem cells", **Biomaterials Day** at Texas A&M University, College Station, TX (June 2014)

7 J Zoldan, "Human induced pluripotent stem cells based therapies for peripheral arterial disease", **American Heart Association**, Mid-Market Team Meeting, Austin, TX, (January 2017)

8 J Zoldan, "Physical cues in cardiac differentiation", **1st Central Texas Stem Cell Network Meeting**, Austin, TX (January 2018)

9 J Zoldan "The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Distinguished Speaker, Rice University Department of Bioengineering Colloquium**, Houston, TX (April 2018)

10 J Zoldan "The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Biological Research Lecture series, University of Mary Hardin-Baylor**, Belton, TX (April 2018)

11 J Zoldan " Microenvironments for engineering the differentiation of human induced pluripotent stem cells" **The national diversity in STEM conference (SACNAS)**, San Antonio, TX (October 2018)

12 J Zoldan "The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Biomedical Engineering Lecture Series, the University of California at Irvine**, CA (November 2018)

13 J Zoldan "The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Cellular and Molecular Biology Seminar Speaker, the University of Texas at San Antonio**, San Antonio, TX (February 2019)

14 J Zoldan "The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Department of Biomedical Engineering Seminar Speaker, Tufts University**, Medford, MA (February 2019)

15 J Zoldan "Quantifying the vasculogenic potential of iPSC-EPs in collagen hydrogels", **The 5th Annual San Antonio Conference on Stem Cell Research and Regenerative Medicine (RegenMED)**, San Antonino, TX (February 2019)

16 J Zoldan "The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Biomedical Engineering Seminars, University of Rochester**, Rochester, NY (March 2019)

17 J Zoldan "The role of biophysical and biochemical cues in engineering stem cell microenvironments", The **Bioengineering Seminar Series, University of Maryland**, College Park, MD (April 2019)

18 J Zoldan "Quantifying the vasculogenic potential of iPSC-EPs in ECM based hydrogels", **The 8th International Conference on Bioengineering and Nanotechnology**, Baltimore, MD (May 2019)

19 J Zoldan "The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Seminar Series in the Department of Chemical and Biological Engineering at the University of Wisconsin-Madison**, Madison, WI (September 2019)

20 J Zoldan, "The vasculogenic potential of iPSC-EPs in ECM based hydrogels", **Seminar Series in the Meinig School of Biomedical Engineering, Cornell University**, Ithaca, NY (September 2019)

Conference Presentations

Members of the Zoldan laboratory are underlined. Postdoctoral Fellows are double underlined

Prior to Joining UT Austin

1 J Zoldan, A Siegmann, M Narkis, "Characterization of ternary immiscible polymer Blends", Israel Polymers and Plastics Society, Tel- Aviv, Israel (December 1998)

2 J Zoldan, A Siegmann, M Narkis, "Structure and properties of ternary immiscible polymer blends", The Ninth Israeli Materials Engineering Conference (IMEC 9), Haifa, Israel (December 1999)

3 J Zoldan, A Siegmann, M Narkis, "Encapsulation during processing in the molten state", PPS'2001, Anatalya, Turkey (October 2001)

4 J Zoldan, A Siegmann, M Narkis, "Structure and properties of ternary immiscible polymer blends", Polymers For Advanced Technologies (PAT), Eilat, Israel (September 2001)

5 J Zoldan, A Siegmann, M Narkis, "Encapsulation during processing in the molten state", Israel Polymers and Plastics Society, Tel-Aviv, Israel (December 2001)

6 J Zoldan, A Siegmann, M Narkis, "Morphology and dielectric properties of PP/NY/CB composites", Israeli Materials Engineering Conference (IMEC), Tel-Aviv, Israel (December 2003)

7 J Zoldan, A Siegmann, M Narkis, "Morphology and dielectric properties of PP/NY/CB composites", Israel Polymers and Plastics Society, Tel-Aviv, Israel (December 2004)

8 J Zoldan, A Siegmann, M Narkis, "PP/NY/CB blends processed just below the NY melting anisotropy in the structure and properties", 8th European Symp On Polymer Blends and Eurofill 2005, Bruges, Belgium (May 2005)

9 J Zoldan, A Siegmann, M Narkis, "Property anisotropy in polypropylene (PP)/ nylon (NY)/ carbon black (CB) blends, processed slightly below the NY melting temperature", Polymers For Advanced Technologies (PAT), Budapest, Hungary (September 2005)

10 J Zoldan, Y Oved, R Langer, S Levenberg, "Endothelial tissue engineering using human embryonic stem cells", The International Society of Stem Cell Research (ISSCR), Toronto, Canada (June 2006)

11 J Zoldan, A Lytton-Jean, E D Karagiannis, K Deiorio-Hagar, L M Bellan, R Langer, D G Anderson, "Directing human embryonic stem cell differentiation by non-viral delivery of siRNA in 3D cultures", The International Society of Stem Cell Research (ISSCR), Toronto, Canada (June 2011)

12 J Zoldan, R Langer, "Engineering the differentiation of human embryonic stem cells", The Gordon Research Conference on Biomaterials & Tissue Engineering, Holderness, NH (July 2011)

13 J Zoldan, R Langer, "Engineering the human embryonic stem cells niche", Biomedical Engineering Society (BMES), Hartford, CT (October 2011)

14 J Zoldan, H Epstein-Barash, A Kusanagi, B Chertok, C Y Lee, A Hayward, D S Kohane, D G Anderson, R Langer, "Smart hydrogels for in-situ differentiation of human embryonic stem cell into fully vascularized tissue", Biomedical Engineering Society (BMES), Hartford, CT (October 2011)

15 J Zoldan, A Lytton-Jean, E D Karagiannis, K Deiorio-Hagar, L M Bellan, R Langer, D G Anderson, "3D siRNA environment for directing human embryonic stem cell differentiation", The 11th US-Japan Symposium on Drug Delivery Systems, Maui, Hawaii (December 2011)

16 E D Karagiannis, J Zoldan, R Langer, D G Anderson, "Systems biology approaches to direct human embryonic stem cell differentiation using siRNAs", Biomedical Engineering Society (BMES), Atlanta GA (October 2012)

17 J Zoldan, H Epstein-Barash, A Kusanagi, B Chertok, C Y Lee, A Hayward, D S Kohane, D G Anderson, R Langer, "Temporally Controlled differentiation of human embryonic stem cells into vascular networks", The 8th Stem cell Summit, Boston, MA (April 2012)

18 J Zoldan, R Langer, K F Jensen, "A microfluidic approach to iPSCs generation", International Society of Stem Cell Research (ISSCR), Boston, MA (June 2013)

19 J Zoldan, R Langer, "Microenvironments for hESC differentiation", International Society of Stem Cell Research (ISSCR), Boston, MA (June 2013)

In Rank

20 C Tu, Z Smilansky, N Raje, J Zoldan, "Monitoring protein synthesis in single live multiple myeloma cells", Biomedical Engineering Society (BMES), San Antonio, TX (October 2014)

21 A Allen, L Geuss, L J Suggs, J Zoldan, "PEGylated Fibrin biomaterials for cardiomyocyte cultivation", Biomedical Engineering Society (BMES), San Antonio, TX (October 2014)

22 A Joaquin, N Peppas, J Zoldan, "Hydrogel polymer libraries for developing induced pluripotent stem cell-derived cardiac patches", Biomedical Engineering Society (BMES), San Antonio, TX (October 2014)

23 A Joaquin, N Peppas, J Zoldan, "Hydrogel polymer libraries for developing induced pluripotent stem cell-derived cardiac patches", American Institute for Chemical Engineers (AIChE,) Atlanta, GA (November 2014)

24 A Joaquin, N Peppas, J Zoldan, "Hydrogel polymer libraries for developing induced pluripotent stem cell-derived cardiac patches", Tissue Engineering and Regenerative Medicine International Society (TERMIS), Washington, DC (December 2014)

25 C Tu, Z Smilansky, N Raje, J Zoldan, "Monitoring protein synthesis in single live cancer cells", Biomedical Engineering Society (BMES), Tampa, FL (October 2015)

26 A Allen, A Dugger, L J Suggs, J Zoldan, "PEGylated fibrinogen electrospun scaffolds for cardiomyocyte culture", Biomedical Engineering Society (BMES), Tampa, FL (October 2015)

27 S Maris, A Allen, J Zoldan, L J Suggs, "PEGylated fibrinogen electrospun scaffolds for cancer cell culture",

Biomedical Engineering Society (BMES), Tampa, FL (October 2015)

28 P Deshpande, R Xu, A Allen, J Zoldan, "Construction of a bioartificial kidney using organ ECM and naive pluripotent stem cells", Biomedical Engineering Society (BMES), Tampa, FL (October 2015)

29 A Allen, L J Suggs, J Zoldan, "Cell alignment during cardiac differentiation", Weinstein Cardiovascular Development and Regeneration Conference, Durham, NC (May 2016)

30 A-L Feggins, A Allen, J Zoldan, "Breast cancer cell behavior on electrospun fibrous scaffolds", Biomedical Engineering Society (BMES), Minneapolis, MN (October 2016)

31 A Allen, E Barone, C O Crosby, L J Suggs, J Zoldan, "Electrospun PNIPAAm/PCL fibers for anisotropic cell sheeting", Texas Biomaterials Day, Austin, TX (June 2017) Won 2nd place in the poster presentation competition

32 C O Crosby, W Deng, D Shu, J Zoldan, "Mimicking embryological vascular development in liposome-laden hydrogels", Texas Biomaterials Day, Austin, TX (June 2017)

33 C Tu, L Santo, Y Mishima, N Raje, Z Smilansky, J Zoldan, "Monitoring protein synthesis in single live cancer cells" Texas Biomaterials Day, Austin, TX (June 2017)

34 A Allen, E Barone, L J Suggs, J Zoldan, "Effect of matrix anisotropy on cardiac differentiation", The Gordon Research Conference on Biomaterials & Tissue Engineering, Holderness, NH (July 2017)

35 A Allen, E Barone, C O Crosby, L J Suggs, J Zoldan, "Electrospun PNIPAAm/PCL fibers to generate anisotropic cell sheets", Biomedical Engineering Society (BMES), Phoenix, AZ (October 2017)

36 C O Crosby, W Deng, D Shu, J Zoldan, "Mimicking embryological development in liposome-laden hydrogels", Biomedical Engineering Society (BMES), Phoenix, AZ (October 2017)

37 C O Crosby, W Deng, D Shu, J Zoldan, "Mimicking embryological vascular development in liposome-laden hydrogels", International Society of Stem Cell Research (ISSCR), Boston, MA (June 2017)

38 C Tu, A Allen, W Deng, O Conroy, M Nambiar, J Zoldan, "Commonly used thiol-containing antioxidants reduce cardiac differentiation and alter gene expression ratios of sarcomeric isoforms", Miami Winter Symposium-Stem Cells, Miami, FL (January 2018)

39 A Allen, J Zoldan, "Matrix anisotropy in cardiac differentiation and cell sheeting", Society of Biomaterials (SFB), Atlanta, GA (April 2018)

40 C O Crosby, D Shu, J Zoldan, "Characterizing the effect of cell-matrix interactions on the differentiation and subsequent vasculogenesis of iPSC-derived vascular progenitor cells", Society of Biomaterials (SFB), Atlanta, GA (April 2018)

41 C O Crosby, D Valliappan, C Tu, J Zoldan, "Cell-matrix interactions regulate the vasculogenic potential of iPSC-derived vascular progenitor cells", Texas Biomaterials Day, College Station, TX (June 2018)

42 C O Crosby, J Zoldan, "Cell-matrix interactions regulate the vasculogenic potential of iPSC-derived endothelial progenitors", 1st UT BME Student Retreat, Austin, TX, (August 2018)

43 A Allen, C O Crosby, J Zoldan, "Matrix anisotropy in cardiac differentiation and cell sheeting", Cellular and Molecular Bioengineering (CMBE) Conference, San Diego, CA (January 2019)

44 C O Crosby, D Valliapan, D Shu, C Tu, J Zoldan, "Quantifying the vasculogenic potential of iPSC-derived vascular progenitor cells in collagen hydrogels", Cellular and Molecular Bioengineering (CMBE) Conference, San Diego, CA (January 2019)

45 C O Crosby, J Zoldan, "Quantifying the vasculogenic potential of iPSC-derived vascular progenitor cells in collagen hydrogels", 2nd Rock Stars of Regenerative Engineering, San Francisco, CA (January 2019) Selected as one of two students for oral presentation

46 C O Crosby, D Valliapan, D Shu, C Tu, J Zoldan, "Quantifying the vasculogenic potential of iPSC-derived vascular progenitor cells in collagen hydrogels", Society of Biomaterials (SFB), Seattle, WA (April 2019)

47 C O Crosby, J Zoldan, "Quantifying the vasculogenic potential of iPSC-derived vascular progenitor cells in collagen hydrogels", Texas Biomaterials Day, Houston, TX (June 2019) Selected for oral presentation in the Rapid Fire Session

PATENTS

Published

1 T E Milner, J Zoldan, D R Fleming, N Katta, J A Rector, M R Gardner, A Estrada, A McElroy, M Feldman, "Surgical cell, biologics and drug deposition *in vivo*, and real-time tissue modification with tomographic image guidance and methods of use", US Patent Application No 15/883,963, January 2018, US Patent Publication No US 2018/0228552 A1, August 2018 *Work conducted at UT*

2 J Zoldan, A Allen, "Electrospun PNIPAAm/PCL fiber mats for aligned cell sheets", US Patent Application No 16/023,147, June 2018, US Patent Publication No US 2019/0003091 A1, January 2019 *Work conducted at UT*

Provisional

1 J Zoldan, H Epstein-Barash, A Kusanagi, B Chertok, C Y Lee, A Hayward, D S Kohane, D G Anderson and R Langer, "In situ forming hydrogels for differentiation of human embryonic stem cell into vascular networks and ischemic tissue treatment", US Provisional Application No 61/713,462

GRANTS AND CONTRACTS:

Co-Investigators	Title	Agency	Grant Total	Grant Period
PI	Ischemia therapy via temporally controlled differentiation of induced pluripotent stem cells into vascular networks	American Heart Association	$308,000 ($308,000 candidate share)	07/2015 - 06/2019
PI	Promoting Neurovascularization Following Stroke	Alliance for Regenerative Rehabilitation Research and Training (AR3T)	$100,000 ($100,000 candidate share)	07/2018-06/2020
PI Csiro, Baker, Dunn, Ben-Yakar (fullE)	Printing Vasculature with Photosensitive Liposomes	NIH NIBIB	$622,735 ($557,052 candidate share)	09/2019-08/2022
PI	Printing in situ cues for blood vessel formation using light patterning of photosensitive liposomes	American Heart Association	$200,000 ($200,000 candidate share)	Pending
PI	Tunable biomaterials for regulating the vasculogenic potential of iPSC-derived vascular progenitor cells	NIH	$1,884,030 (1,884,030 candidate share)	Pending

PI	Connexin-based biomaterial for coupling engineered tissue	NIH	$622,838 ($622,838 candidate share)	Pending
PI	A microfluidic delivery approach to metabolically control cardiac differentiation and maturation	NSF	$279,000 ($279,000 candidate share)	Pending
PI	Temporally controlled differentiation of iPSCs into vascular networks for inducing neurovascularization in stroke models	NIH	$2,179,764 ($2,000,000 candidate share)	Pending
Co-I	Line excitation array detection (LEAD) fluorescence microscopy for ultrafast 3D flow cytometry	NIH	$1,482,838 ($200,000 candidate share)	Pending

Total Awards: $1,030,715
Total Candidate Share: $945,052

POSTDOCTORATE SUPERVISION COMPLETED

Wei Deng 12/2015 – 06/2018 (Department of Statistics, Texas A&M University)

POST DOCTORATE SUPERVISION IN PROGRESS

Nima Montahan 10/2018- Present

PH.D. SUPERVISIONS COMPLETED:

Allen, Alicia	"Anisotropy in cell sheeting and cardiac differentiation "	05/2018	Biomedical Engineering	Univ of Texas at Austin, (Currently a senior scientist at United Therapeutics)
Tu, Chengyi	"Role of reactive oxygen species in pluripotent stem cells cardiac differentiation and survival"	08/2018	Biomedical Engineering	Univ of Texas at Austin, (Currently a postdoctorate fellow at Stanford)

M.S. SUPERVISIONS COMPLETED:

Joaquin, Alysa	"Chemically modified hyaluronic acid biomaterials for cell culture and tissue engineering"	08/2016	Biomedical Engineering	Univ of Texas at Austin, (Currently a Project Manager at BlueShift Materials Inc)
Strickland, Julie	Non-thesis M S Degree	12/2017	Biomedical Engineering	Univ of Texas at Austin (Currently a Project Specialist at Syneos Health)

PH.D. IN PROGRESS:

A Students admitted to candidacy

Crosby, Cody

B Post M S students preparing to take Ph D qualifying exam

N/A

M.S. IN PROGRESS:

N/A

UNDERGRADUATE STUDENT ADVISING

Undergraduate Student Researchers From UT

* Indicates author of peer-reviewed publication

1 **Alexandra (Dugger) Keierleber** Biomedical Engineering (Fall 2013-Summer 2014), Currently, a Cell Therapy Sales Specialist at G E Healthcare
2 **Smridhi Mahajan** Biomedical Engineering (Fall 2013-Spring 2014), Currently a medical student at UT health Houston
3 **Priyanka Deshpande** Biomedical Engineering (Spring 2014-Spring 2016), Currently, a medical student at Baylor School of Medicine
4 ***Robert Xu** Biomedical Engineering (Summer 2014-Spring 2017), Currently a Business Technology Analyst at Deloitte
5 ***Madhavi Nambiar** Biomedical Engineering (Summer 2014-Fall 2016), Currently a Senior Consultant at Quorum Software
6 **Karl Solomon** Biomedical Engineering (Fall 2014-Fall 2015), Currently a Design Engineer at Stryker
7 **Jorge Gomez Medellin** Chemical Engineering (Summer 2015-Fall 2016), Currently, a graduate student at Chicago University
8 **Anika Tanwani** Biomedical Engineering (Summer 2015-Fall 2016), Currently a medical student at the University of Texas Medical Branch at Galveston
9 ***Meghana Koleti** Biomedical Engineering (Summer 2015-Spring 2018), Currently a medical student at UT Medical School at San Antonio
10 **Christine Wei**, Biomedical Engineering (Spring 2016- Spring 2017), Currently a Quality Engineer at LivaNova
11 ***David Shu**, Chemical Engineering (Summer 2016-Spring 2019), Continuing undergraduate
12 ***Elissa Barone** Biomedical Engineering (Fall 2015-Spring 2018), Currently a System Engineer at Illumina Inc
13 ***Krista Polansky**, Biomedical Engineering (Fall 2016-Summer 2018), Continuing undergraduate
14 **Yilun Wang**, Electrical Engineering (Fall 2016), Continuing undergraduate

15 **Daegi Lee** Biomedical Engineering Spring 2017-Summer 2017), Currently a Solution Engineer at Oracle
16 * **Olivia Conroy**, Biomedical Engineering (Spring 2017-Spring 2019), Continuing undergraduate
17 * **Deepti Valliappan**, Biomedical Engineering (Summer 2017- present)
18 **Shahar Pedazhur** Biomedical Engineering (Spring 2018- present)
19 **Remy Fenrich** Biomedical Engineering (Spring 2018- present)
20 **Analaura Rodriguez** Biomedical Engineering (Spring 2018- present)
21 **Shreya Ramesh** Biomedical Engineering (Spring 2018- present)

Visiting Undergraduate Student Researchers

22 **Stefani Maris** Engineering, Louisiana State University, NSF undergraduate research fellow (Summer 2015), Currently Field Engineer at Schlumberger Technology
23 **Madelyn Szilagyi-Jones** Biology, Case Western Reserve University (Summer 2015), Currently a Research Technician at Baylor School of Medicine
24 **Alston-Laura Feggins** Florida Institute of Technology, NSF undergraduate research fellow (Summer 2016), Currently a junior Digital Analyst at Booz Allen Hamilton
25 **Adam Jerome Poole** Biomedical Engineering, Stanford (Fall 2016)

HIGH SCHOOL STUDENT ADVISING

1 **Kisha Patel** Liberal Arts and Science Academy, Austin (Summer 2015-Summer 2016), Currently an undergraduate student at John Hopkins University at the Biomedical Engineering Department

DISSERTATION COMMITTEES

Dissertation Completed

- Dr Laura Geuss, Biomedical Engineering, defended 2014
- Dr Laura Ricles, Biomedical Engineering, defended 2014
- Dr Jonathan Peters, Chemical Engineering, defended 2015
- Dr Avinash Kaur Gadok, Biomedical Engineering, defended 2017
- Dr Lindsey Sharpe, Biomedical Engineering, defended 2017
- Dr Salma Ayoub, Biomedical Engineering, defended 2018
- Dr Zachary Imam, Biomedical Engineering, defended 2018
- Dr Alicia Allen, Biomedical Engineering, defended 2018
- Dr Chengyi Tu, Biomedical Engineering, defended 2018
- Dr Hunter Joyce, Biomedical Engineering, defended 2018
- Dr Kiheon Baek, Biomedical Engineering, defended 2019
- Kabir Dhada, Biomedical Engineering, defended 2019

Dissertation in Progress

- Ms Amanda K Vaughn, Nutrition
- Ms Aimee Chi Zhao, Biomedical Engineering
- Mr Nicholas White, Biomedical Engineering
- Mr Alexander Noblett, Biomedical Engineering
- Ms Jaewon Lee, Biomedical Engineering
- Ms Kayla Henderson, Biomedical Engineering
- Mr Cody Crosby, Biomedical Engineering
- Ms Aaliyah Shodeinde, Chemical Engineering
- Ms Taneidra Walker, Biomedical Engineering
- Mr Prachi Dhavalikar, Biomedical Engineering

PH.D. QUALIFYING COMMITTEES

- Mr Hunter Joyce, Biomedical Engineering, passed 2014
- Mr Chris Martin, Biomedical Engineering, passed 2014 (chair)
- Mr Kabir Dhada, Biomedical Engineering, passed 2015 (chair)
- Mr Kihoen Baek, Biomedical engineering, passed 2015
- Ms Aimee Chi Zhao, Biomedical engineering, passed 2015
- Mr Ryan Woodel, Biomedical Engineering, passed 2015
- Ms Chelsea Kraynak, Biomedical Engineering, passed 2016 (chair)
- Ms Ming-Ming Tran, Biomedical Engineering, failed 2016 (chair)
- Ms Marissa Wechsler, Biomedical Engineering, passed 2016 (chair)
- Ms Jaewon Lee, Biomedical engineering, passed 2016 (chair)
- Mr Andre DeGroot, Biomedical Engineering, passed 2016 (chair)
- Mr Alex Khan, Biomedical Engineering, passed 2017
- Mr Hao Liu, Biomedical Engineering, passed 2018
- Mr Daniel Chavarria, Biomedical Engineering, passed 2018 (chair)
- Mr Justin Houser, Biomedical Engineering, passed 2018
- Ms Jessica Widman Biomedical Engineering, passed 2018
- Ms Sangamithra Vardhan, Biomedical Engineering, passed 2018
- Mr Wenbai Huang, Kinesiology, passed 2019
- Mr Paul Gries, Nutrition, passed 2019
- Ms Dana Jenkins, Biomedical Engineering 2019
- Mr ByunGee Im, Biomedical Engineering 2019
- Mr Miles Massida, Biomedical Engineering 2019
- Ms Elizabeth Bender, Biomedical Engineering 2019
- Ms Brianna Morales, Biomedical Engineering 2019
- Ms Sadhana Gollapudi, Biomedical Engineering 2019

STUDENT AND TRAINEE AWARDS

- Alysa Joaquin Recipient of the National Science Foundation Graduate Research Fellowship Program (Summer 2013-Summer 2016)
- Alysa Joaquin Recipient of the National Science Foundation Prestigious Bruton Award (Fall 2013)
- Alysa Joaquin Recipient of the University of Texas at Austin, Cockrell School of Engineering, Engineering Doctoral Fellowship (Fall 2013-Spring 2016)
- Alysa Joaquin Recipient of the University of Texas at Austin Graduate School Professional Development Award (Fall 2014)
- Alysa Joaquin Recipient of the University of Texas at Austin, Dean's Prestigious Fellowship (Fall 2014, Fall 2015)
- Alysa Joaquin Recipient of the National Science Foundation Supplement (Spring 2015)
- Alicia Allen Recipient of the University of Texas at Austin Graduate School, Dean's Prestigious Fellowship (Fall 2015, Fall 2016, Fall 2017)
- Alicia Allen Recipient of the University of Texas at Austin, Cockrell School of Engineering, Virginia & Ernest Cockrell, Jr Fellowship in Engineering (Fall 2013-Spring 2017)
- Alicia Allen Recipient of the Travel Award to attend the Weinstein Cardiovascular Development and Regeneration Conference, Durham, NC (2016)
- Alicia Allen Recipient of the University of Texas at Austin Graduate School, Professional Development Award (Fall 2017)
- Alicia Allen Recipient of the National Science Foundation Graduate Research Fellowship Program (Summer 2015-Spring 2018)
- Alicia Allen Won 2nd place in the poster presentation competition at the Texas Biomaterials Day, Austin, TX (2017)

- Alicia Allen Recipient of the University of Texas at Austin, Cockrell School of Engineering, Runge Endowed Presidential Fellowship in Biomedical Engineering (Fall 2017-Spring 2018)
- Chengyi Tu Recipient of the University of Texas at Austin Graduate School Recruitment Fellowship (Fall 2013-Spring 2017)
- Chengyi Tu Recipient of the University of Texas at Austin Graduate School, Professional Development Grant (Spring 2018)
- Chengyi Tu Recipient of the University of Texas at Austin Graduate School, Continuing Graduate Fellowship (Summer 2018)
- Chengyi Tu Recipient of the University of Texas at Austin, Cockrell School of Engineering, Cullen Crain Endowed Scholarship in Engineering (Fall 2017-Spring 2018)
- Julie Strickland Recipient of the National Institutes of Health T32 Graduate Training Fellowship (Fall 2015-Summer 2016)
- Julie Strickland Recipient of the University of Texas at Austin Graduate School, Engineering Foundation Scholarship (Fall 2015-Spring 2016)
- Julie Strickland Recipient of the University of Texas at Austin, Cockrell School of Engineering, Earnest & Elsie Clawson Scholarship (Fall 2016-Spring 2017)
- Cody Crosby Recipient of the National Institutes of Health T32 Graduate Training Fellowship (Fall 2015-Summer 2016)
- Cody Crosby Recipient of the University of Texas at Austin, Cockrell School of Engineering, Thrust 2000 Fellowship (Fall 2015-Spring 2019)
- Cody Crosby Recipient of the University of Texas at Austin, Graduate School, Provost Excellence (Fall 2015-Summer 2018)
- Cody Crosby Received Honorable Mention in the National Science Foundation Graduate Research Fellowship Program Competition (Fall 2017)
- Cody Crosby Recipient of the University of Texas at Austin Graduate School, Professional Development Award (Spring 2018)
- Cody Crosby Selected for oral presentation at the 1st UT BME Student Retreat, Austin, TX (2018)
- Cody Crosby Selected as one of two students for oral presentation at the 2nd Rock Stars of Regenerative Engineering, San Francisco, CA (2019)
- Cody Crosby Selected for oral presentation in the Rapid Fire Session at the Texas Biomaterials Day, Houston, TX (June 2019)
- Robert Xu Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2014-Summer 2015)
- Priyanka Deshpande Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2014- Summer 2015)
- Priyanka Deshpande Won 2nd Place in the Cockrell School Undergraduate Research Poster Competition (Spring 2015)
- Karl Solomon Recipient of the best undergraduate student poster award in the Annual University of Texas at Austin Nano Night poster session (Fall 2014)
- Madhavi Nambiar Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2015 -Summer 2016)
- Meghana Koleti Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2015 -Summer 2016)
- Anika Tanwani Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2015- Summer 2016)
- Jorge Gomez Medellin Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Spring 2016-Summer 2016)
- Krista Polansky Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2016-Summer 2017)
- David Shu Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2016-Summer 2017)

- Olivia Conroy Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2017-Summer 2018)
- Deepti Valliappan Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2017-Summer 2018)
- Deepti Valliappan Finalist for the BME Undergraduate Poster Competition (2018)

UNDERGRADUATE HONORS THESIS

- Ms Priyanka Deshpande, Spring 2016, "Construction of a bioartificial kidney using decellularized organ ECM and naive pluripotent stem cells"
- Ms Madhavi Nambiar, Spring 2016, "The effects of oxidative stress via high glucose on mouse embryonic derived embryoid body formation"
- Ms Divya Ramamoorthy, Spring 2016, "The effect of mechanotransduction on cardiomyocyte viability and differentiation" (2nd reader)
- Ms Pauline Margaret Berens, Spring 2017, "Exploding liposomes delivering growth factors to improve healing" (2nd reader)
- Mr Ethan Kwan, Spring 2018, "Characterization of a decellularized scaffold for the study of human mitral valve interstitial cells" (2nd reader)

SENIOR DESIGN PROJECT TEAMS (BME 371)

- Spring 2019 A Magnetic Suturing Device for Wrist Arthroscopy
- Spring 2019 A Paper-Based Diagnostic of Immunoglobulins
- Spring 2017 Access Hole Closure after Endoscopic Transsphenoidal Surgery
- Spring 2015 Tissue scull anchor design

VITA

Dr Zoldan received her BSc degree in chemistry from the Hebrew University, and then pursued her master's degree and a doctorate in the Technion-Israel Institute of Technology, Department of Materials Engineering, specializing in polymer science For her postdoctoral training, she joined Dr Shulamit Levenberg's Lab at the Technion and delved into stem cell biology Receiving both the Aly Kauffman Fellowship and the Technion's Outstanding Woman Scientist in Engineering Award allowed her to join Dr Robert Langer's lab at the Massachusetts Institute of Technology In the Langer lab, she focused on nucleic acid delivery to human embryonic stem cells and protein microfluidic delivery In 2013, Dr Zoldan joined The University of Texas at Austin as an assistant professor Research in the Zoldan lab focuses on human induced pluripotent stem cells as a model system to explore key principles underlying cardiovascular tissue formation processes and regenerating ischemic tissue Since joining UT, Dr Zoldan's group has contributed two patents, and 17 peer-reviewed manuscripts, published in top journals of her field Two M S students and two Ph D students have recently completed their graduate degrees under Dr Zoldan's mentorship Each of these trainees has continued to successful careers, either in industry or as postdoctoral researchers at prestigious institutions such as Stanford University Dr Zoldan has recently received the prestigious Scientist Development Grant from the American Heart Association, the Alliance of Regenerative Rehabilitation Research and Training seed grant, and was named a 2017 Emerging Investigator by the Journal of Biomaterials Science Additionally, she is currently serving on the scientific advisory board for the next Tissue Engineering and Regenerative Medicine International Society World Congress

Date: Sept 19, 2019

Candidate's Summary of Activities

Metric	Value
Number of peer-reviewed journal publications (in rank and career)	19 34
Number of peer-reviewed conference proceedings (in rank and career)	5 / 8
Number of journal papers in rank with supervised student(s) and/or post-docs from UT as co-author(s)	17
Number of journal papers in rank with supervised student(s) from UT as co-author*	17
*Total citations of all publications (career) from ISI Web of Knowledge	605
*Largest number of citations for a single paper based on work at UT (ISI Web of Knowledge)	18
*h-index (career) from ISI Web of Knowledge	10
Total citations of all publications (career) from Google Scholar	919
Largest number of citations for a single paper based on work at UT (Google Scholar)	25
h-index (career) from Google Scholar	13
Total external research funding raised in rank	$1,930,715
Total external research funding raised in rank (candidate's share)	$1,541,092
Total number of external grants/contracts awarded in rank	3
Number of external grants/contracts awarded in rank as PI	3
PhD students completed in rank (sole supervisions and co-supervisions)†	2 / 0
MS students completed in rank (sole supervisions and co-supervisions)†	2 / 0
Current PhD students in pipeline (sole supervisions and co-supervisions as of 8/31/2019) †	1 / 0
Current MS students in pipeline (sole supervisions and co-supervisions as of 8/31/2019) †	0 / 0
Number of courses taught	3
Total number of students taught in organized courses	376
Average instructor rating for undergraduate courses	4 16
Average instructor rating for graduate courses	5 0
Average course rating for undergraduate courses	4 03
Average course rating for graduate courses	5 0
Number of teaching awards	0
Student organizations advised	0
Undergraduate researchers supervised	25
Service on journal editorial boards	0
Number of symposia organized	0

Complete reverse chronological list of publications and scholarly/creative works
Janet Zoldan

Title of Dissertation: Electrical conductivity of carbon black containing immiscible polymer blends processed below the melting temperature of the dispersed polymer
Dissertation Advisor: Dr. Amon Siegmann, Technion, Institute of Technology, Haifa, Israel

Section 1. Works published, in press, accepted, or under contract while in current rank at UT Austin.
Members of the Zoldan laboratory are underlined. Postdoctoral fellows are double underlined.

1. Nima Momtahan, Cody O. Crosby, and Janet Zoldan*, The role of reactive oxygen species in in-vitro cardiac maturation", *Trends in Molecular Medicine*. DOI:10.1016/j.molmed.2019.04.005. Epub ahead of time (May 2019). *Corresponding author*

    - Co-authors: Nima Momtahan, postdoctoral fellow in the Zoldan laboratory; Cody O. Crosby, doctoral student in the Zoldan laboratory.
    - Statement of contribution: I wrote this invited review with the assistance of my advisees.

2. Will Goth, Sam Potter, Alicia Allen, Janet Zoldan, Michael S. Sacks, James W. Tunnell, Non-destructive reflectance mapping of collagen fiber alignment in multi-layered tissues", *Annals of Biomedical Engineering*, 47(5), p. 1250-1264. DOI: 10.1007/s10439-019-02233-0 (May 2019). Featured on the May cover.

    - Co-authors: Will Goth, doctoral student in the Tunnell and Sacks laboratories; Sam Potter, graduate student in the Sacks laboratory; Alicia Allen, doctoral student in the Zoldan laboratory; Michael S. Sacks is a faculty peer in the Department of Biomedical Engineering, University of Texas at Austin; James W. Tunnell is a faculty peer in the Department of Biomedical Engineering, University of Texas at Austin.
    - Statement of contribution: Under my sole supervision, Alicia generated a controlled experimental polymer fiber model system, which she then imaged and quantified as a validation to imaging and quantification performed by the reflectance mapping method developed in this manuscript. I designed these experiments, supervised Alicia's work, wrote the related section in the manuscript, and assisted in editing the entire manuscript.

3. Alicia Allen, Elissa Barone, Nima Momtahan, Cody O. Crosby, Chengyi Tu, Wei Deng, Krista Polansky, Janet Zoldan*, Temporal impact of substrate anisotropy on differentiating cardiomyocyte alignment and functionality", *Tissue Engineering, Part A*. DOI: 10.1089/ten.TEA.2018.0258, Epub ahead of print (February 2019). *Corresponding author.

    - Co-authors: Alicia Allen, doctoral student in the Zoldan laboratory; Elissa Barone, undergraduate researcher in the Zoldan laboratory; Nima Momtahan, postdoctoral fellow in the Zoldan laboratory; Cody O. Crosby, doctoral student in the Zoldan laboratory; Chengyi Tu, doctoral student in the Zoldan laboratory; Wei Deng, postdoctoral fellow in the Zoldan laboratory; Krista Polansky, undergraduate researcher in the Zoldan laboratory.

- Statement of contribution: I developed the concept of this manuscript, designed the experiments, supervised the work of my advisees, and wrote the manuscript.

4. Cody O. Crosby and Janet Zoldan*, A novel in vitro 3D model and computational pipeline to quantify the vasculogenic potential of iPSC-derived endothelial progenitors", *Journal of Visual Experiments*, 147, e59342. DOI:10.3791/59342 (May 2019). **Corresponding author.*

   - Co-authors: Cody O. Crosby, doctoral student in the Zoldan laboratory.
   - Statement of contribution: I developed the concept of this manuscript, designed the experiments, together with my student, Cody, I developed the computational pipeline, supervised his work, and wrote the manuscript.

5. Cody O. Crosby and J. Zoldan*, Mimicking the physical cues of the ECM in angiogenic biomaterials", *Regenerative Biomaterials*, 6(2), p. 61-73. DOI: 10.1093/rb/rbz003 (February 2019). **Corresponding author.*

   - Co-authors: Cody O. Crosby, doctoral student in the Zoldan lab.
   - Statement of contribution: I wrote this invited review with the assistance of my student, Cody.

6. Cody O. Crosby, Deepti Vallıappan, David Shu, Sachin Kumar, Chengyi Tu, Wei Deng, Sapun H. Parekh, Janet Zoldan*, Quantifying the vasculogenic potential of iPSC-derived endothelial progenitors in collagen hydrogels", Special Issue on Engineered Tissues Derived from Induced-Pluripotent Stem Cells (iPSCs) for Disease Modeling, Drug Discovery, and Replacement Therapies, *Tissue Engineering, Part A*. DOI: 10.1089/ten.TEA.2018.0274, Epub ahead of print (January 2019). **Corresponding author.*

   - Co-authors: Cody O. Crosby, doctoral student in my laboratory; Deepti Vallıappan, undergraduate researcher in the Zoldan laboratory; David Shu, undergraduate researcher in the Zoldan laboratory; Sachin Kumar, postdoctoral fellow in the Parekh laboratory; Chengyi Tu, doctoral student in the Zoldan laboratory; Wei Deng, postdoctoral fellow in the Zoldan laboratory; Sapun H. Parekh, faculty peer at the Department of Molecular Spectroscopy, Max Planck Institute for Polymer Research.
   - Statement of contribution: All experimental studies were done in my laboratory by my students. I developed the concept of this manuscript, designed the experiments, supervised the work of my advisees, and wrote the entire manuscript. Dr. Parekh and his student contributed a supplementary figure, depicting fiber morphology of the hydrogels.

7. Chengyi Tu and Janet Zoldan*, Moving iPSC-derived cardiomyocytes forward to treat myocardial infarction", *Cell Stem Cells*, 23(3), p. 322-323. DOI: 10.1016/j.stem.2018.08.011 (September 2018).**Corresponding author.*

   - Co-authors: Chengyi Tu, doctoral student in the Zoldan lab.
   - Statement of contribution: I wrote this invited commentary with the assistance of my student, Chengyi.

8. Chengyi Tu, Alicia Allen, Wei Deng, Olivia Conroy, Madhavi Nambiar, Janet Zoldan*, Commonly used thiol-containing antioxidants reduce cardiac differentiation and alter gene expression ratios of sarcomeric isoforms", *Experimental Cell Research*, 370(1), p. 150-159. DOI: 10.1016/j.yexcr.2018.06.017 (June 2018). **Corresponding author.*

    - Co-authors: Chengyi Tu, doctoral student in the Zoldan laboratory; Alicia Allen, doctoral student in the Zoldan laboratory; Wei Deng, postdoctoral fellow in the Zoldan laboratory; Olivia Conroy, undergraduate researcher in the Zoldan laboratory; Madhavi Nambiar, undergraduate researcher in the Zoldan laboratory.
    - Statement of contribution: I developed the concept of this manuscript, designed the experiments, supervised the work of my advisees, and wrote the manuscript.

9. Avinash K. Gadok, Chi Zhao, Amanda Menwether, Silvia Ferrati, Tanner Rowley, Janet Zoldan, Hugh D.C. Smyth, Jeanne C. Stachowiak, Display of single-domain antibodies on the surfaces of connectosomes enables gap junction-mediated drug delivery to specific cell populations", *Biochemistry*, 57(1), p. 81-90. DOI: 10.1021/acs.biochem.7b00688 (September 2017).

    - Co-authors: Avinash K. Gadok, graduate student in the Stachowiak lab; Chi Zhao, graduate student in the Stachowiak laboratory; Amanda Menwether, undergraduate researcher in the Stachowiak laboratory; Silvia Ferrati, postdoctoral fellow in the Stachowiak and Smyth laboratories; Tanner Rowley, undergraduate researcher in the Stachowiak laboratory; Hugh D.C. Smyth, faculty peer in the College of Pharmacy, University of Texas at Austin; Jeanne C. Stachowiak peer faculty in the Department of Biomedical Engineering, University of Texas at Austin.
    - Statement of contribution: All experimental studies were performed by Dr. Stachowiak and her students. I worked closely with Dr. Stachowiak and advised mainly on controlled release experiments and assisted with manuscript editing.

10. Sezin Aday, Janet Zoldan, Marie Besnier, Laura Carreto, Jaimy Saif, Rui Fernandes, Tiago Santos, Liliana Bernardino, Robert Langer, Costanza Emanueli and Lino Ferreira, Synthetic microparticles conjugated with VEGF165 improve the survival of endothelial progenitor cells via microRNA-17 inhibition", *Nature Communications*, 8(1), p. 747-761. DOI: 10.1038/s41467-017-00746-7 (September 2017).

    - Co-authors: Sezin Aday, doctoral student in the Ferreira and Langer Laboratory; Marie Besnier, postdoctoral fellow in the Emanueli laboratory; Laura Carreto, research scientist at the University of Aveiro; Jaimy Saif, postdoctoral fellow in the Emanueli laboratory; Rui Fernandes, technician in the Histology and Electron Microscopy Service, Universidad do Porto; Tiago Santos, technician in the Bernardino laboratory; Liliana Bernardino, faculty peer in the Faculty of Health Sciences, University of Beira Interior; Robert Langer, faculty peer in the Department of Chemical Engineering and Koch Institute, Massachusetts Institute of Technology; Costanza Emanueli, faculty peer at the Bristol Heart Institute, School of Clinical Sciences, University of Bristol and in the National Heart and Lung Institute, Imperial College of London; Lino Ferreira, faculty peer at Center for Neurosciences and Cell Biology and faculty of medicine, University of Coimbra.

- Statement of contribution: All experimental studies were performed in the Ferreira and Langer laboratories. As a research scientist in the Langer laboratory, my specific role was to compare the function of endothelial progenitors primed with vascular endothelial growth factor (VEGF) conjugated to gold microparticles and soluble VEGF in in-vivo subcutaneous and hind limb ischemia models. I performed these experiments, analyzed data, wrote the related sections, and assisted in editing the entire manuscript.

11. Chengyi Tu, Robert Xu, Meghana Koleti, Janet Zoldan*, Glycogen synthase kinase-3 inhibition sensitizes human induced pluripotent stem cells to thiol-containing antioxidants induced apoptosis", *Stem Cell Research*, 23, p. 182-187. DOI: 10.1016/j.scr.2017.07.019 (August 2017). **Corresponding author.*

    - Co-authors: Chengyi Tu, doctoral student in the Zoldan laboratory; Robert Xu, undergraduate researcher in the Zoldan laboratory; Meghana Koleti, undergraduate researcher in the Zoldan laboratory.
    - Statement of contribution: I developed the concept of this manuscript, designed the experiments, supervised the work of my advisees, and wrote the manuscript.

12. Alicia Allen, Elissa Barone, Cody O. Crosby, Laura J. Suggs, Janet Zoldan*, Electrospun poly (N-isopropyl acrylamide)/poly (caprolactone) fibers for the generation of anisotropic cell sheets", *Biomaterials Science*, 5(8), p. 1661-1669. DOI: 10.1039/c7bm00324b (July 2017). **Corresponding author.*

    - Co-authors: Alicia Allen, doctoral student in the Zoldan laboratory; Elissa Barone, undergraduate researcher in the Zoldan laboratory; Cody O. Crosby, doctoral student in the Zoldan laboratory; Laura J. Suggs, faculty peer in the Department of Biomedical Engineering, University of Texas at Austin.
    - Statement of contribution: All experimental studies were done in my laboratory by my students. I developed the concept of this manuscript, took the lead role in designing experiments, supervising the work of my advisees, and writing the manuscript as recognized by my role as the corresponding author. Dr. Laura Suggs collaborated with me on this effort and is therefore recognized as a contributing author.

13. Young Cha, Min-Joon Han, Hyuk-Jin Cha, Janet Zoldan, Alison Burkart, Jin H. Jung, Yongwoo Jang, Chun-Hyung Kim, Ho-Chung Jeong, Byung-Gyu Kim, Robert Langer, C. Ronald Kahn, Leonard Guarente, and Kwang-Soo Kim, Metabolic control of primed human pluripotent stem cell fate and function by the miR-200c-SIRT2 axis", *Nature Cell Biology*, 19(5), p. 445-456. DOI: 10.1038/ncb3517 (May 2017).

    - Co-authors: Young Cha, postdoctoral fellow in the Kim laboratory; Min-Joon Han, postdoctoral fellow in the Kim laboratory; Hyuk-Jin Cha, faculty peer at the Department of Biomedical Science, Cha University; Alison Burkart, postdoctoral fellow in the Kahn laboratory; Jin H. Jung, postdoctoral fellow in the Kim laboratory; Yongwoo Jang, postdoctoral fellow in the Kim laboratory; Chun-Hyung Kim, research scientists in the Kim laboratory; Ho-Chung Jeong, doctoral student in the Cha laboratory; Byung-Gyu Kim, research scientist in the Kim laboratory; Robert Langer, faculty peer Department of

Chemical Engineering and the Koch Institute, Massachusetts Institute of Technology; C. Ronald Kahn, faculty peer at the Joslin diabetes center and Harvard Medical School; Leonard Guarente, faculty peer at the Department of Biology, Massachusetts Institute of Technology; and Kwang-Soo Kim, faculty peer at Department of Psychiatry and McLean Hospital, Harvard Medical School.

- Statement of contribution: The majority of the experimental studies were performed in the Kim laboratory. As a research scientist in the Langer laboratory, I performed all proteomic experiments, analyzed the data, and took an active role in writing and editing this manuscript.

14. Yew Liu, Andrew Nguyen, Alicia Allen, Janet Zoldan, Yuxiang Huang, Jonathan Y. Chen, Regenerated cellulose micro-nano fiber matrices for transdermal drug release", *Materials Science and Engineering: C*, 74, p. 485-492. DOI: 10.1016/j.msec.2016.12.048 (May 2017).

    - Co-authors: Yew Liu, visiting doctoral student in the Chen laboratory, Andrew Nguyen, undergraduate researcher at the Chen laboratory; Alicia Allen, doctoral student in the Zoldan laboratory; Yuxiang Huang, visiting doctoral student at the Chen laboratory; Jonathan Y. Chen, faculty peer at the School of Human Ecology, University of Texas at Austin.
    - Statement of contribution: Under my sole supervision, Alicia performed cellular validation studies and demonstrated that the drug-loaded cellulose fiber matrices, developed in the Chen laboratory, are safe. I designed these experiments, supervised Alicia's work, wrote the related section in the manuscript, and assisted in editing the entire manuscript.

15. Nitesh Katta, John A. Rector, Michael R. Gardner, Austin B. McElroy, Kevin C. Choy, Cody O. Crosby, Janet Zoldan, and Thomas E. Milner, Image-guided smart laser system for precision implantation of cells in cartilage", *SPIE Medical Imaging*. DOI: 10.1117/12.2253812 (March 2017).

    - Co-authors: Nitesh Katta, doctoral student in the Milner laboratory; John A. Rector, technician in the Milner laboratory; Michael R. Gardner, doctoral student in the Milner laboratory; Austin B. McElroy, researcher scientist in the Milner laboratory; Kevin C. Choy, undergraduate researcher in the Milner laboratory; Cody O. Crosby, doctoral student in the Zoldan laboratory; Thomas E. Milner, faculty peer in the Department of Biomedical Engineering, University of Texas at Austin.
    - Statement of contribution: I worked closely with Dr. Thomas Milner and his group on developing and validating this system (see also related patent). Under my sole supervision, Cody validated the functionality of this system using our injectable hyaluronic acid-based hydrogels and stem cells. I designed these experiments, supervised Cody's work, wrote the related section in the manuscript, and assisted in editing the entire manuscript.

16. Nicholas Dana, N. Andrew Fowler, Alicia Allen, Janet Zoldan, Laura J. Suggs, Stanislav Emelianov, In vitro photoacoustic sensing of calcium dynamics with arsenazo III", *Laser Physics Letters*, 13(7), e075603. DOI: 10.1088/1612-2011/13/7/075603 (June 2016).

- Co-authors: Nicholas Dana, doctoral student in the Suggs and Emelianov laboratories; Andrew Fowler, doctoral student in the Suggs and Emelianov laboratories; Alicia Allen, doctoral student in the Zoldan laboratory; Laura J. Suggs, faculty peer in the Department of Biomedical Engineering, University of Texas at Austin; Stanislav Emelianov, faculty peer in the Department of Biomedical Engineering, University of Texas at Austin.
- Statement of contribution: Under my sole supervision, Alicia performed cellular validation studies and demonstrated that arsenazo III could serve as a photoacoustic sensor of calcium fluxes in cardiac cells. I designed these experiments, supervised Alicia's work, wrote the related section in the manuscript, and assisted in editing the entire manuscript.

17. Kiheon Baek, Chengyi Tu, Janet Zoldan, Laura J. Suggs, Gene transfection for stem cell therapy", *Current Stem Cell Reports,* 2(1), p. 52-61. DOI: 10.1007/s40778-016-0029-5 (March 2016).

    - Co-authors: Kiheon Baek, doctoral student in the Suggs laboratory; Chengyi Tu, doctoral student in the Zoldan laboratory; Laura J. Suggs, faculty peer in the Department of Biomedical Engineering, University of Texas at Austin.
    - Statement of contribution: In this invited review, together with my student, Chengyi, I wrote the sections related to pluripotent stem cell generation, differentiation, and transfection. Additionally, I assisted in editing the entire manuscript.

18. Chengyi Tu, Loredana Santo, Yuko Mishima, Noopur Raje, Zeev Smilansky, Janet Zoldan*, Monitoring protein synthesis in single live cancer cells", *Integrative Biology,* 8(5), p. 645-653. DOI: 10.1039/c5ib00279f (February 2016). **Corresponding author.*

    - Co-authors: Chengyi Tu, doctoral student in the Zoldan laboratory; Loredana Santo, research scientist in the Raje laboratory; Yuko Mishima, postdoctoral fellow in the Raje laboratory; Noopur Raje, faculty peer in Harvard Medical School; Zeev Smilansky, Founder of Animal Cell Metrology.
    - Statement of contribution: All experimental studies were performed in my laboratory by my student Chengyi. I designed the experiments, supervised Chengyi, and wrote the manuscript. Dr. Raje Noopur provided advice on multiple myeloma biology, and her team generated a supplementary figure, demonstrating that currently available technologies are inefficient in transfecting multiple myeloma cells. Dr. Zeev Smilansky provided advice on transfer ribonucleic acid delivery.

19. Chengyi Tu, Subhamoy Das, Aaron B. Baker, Janet Zoldan*, and Laura J. Suggs*, Nanoscale strategies-treatment for peripheral vascular disease and critical limb ischemia", *ACS Nano,* 9(4), p. 3436-3452. DOI: 10.1021/nn507269g (April 2015). **Corresponding authors.*

    - Co-authors: Chengyi Tu, doctoral student in the Zoldan laboratory; Subhamoy Das, postdoctoral fellow in the Baker laboratory; Aaron B. Baker, faculty peer in the Department of Biomedical Engineering, University of Texas at Austin; Laura J. Suggs, faculty peer in the Department of Biomedical Engineering, University of Texas at Austin.

- Statement of contribution: Together with Dr. Laura Suggs and my student Chengyi we wrote this invited review. Dr. Baker and his student provided advice related to their expertise in delivering proteins.

20. Armon Sharei, Nahyun Cho, Shirley Mao, Emily Jackson, Roberta Poceviciute, Andrea Adamo, Janet Zoldan, Robert Langer, Klavs F. Jensen, Cell squeezing as a robust, microfluidic intracellular delivery platform", *Journal of Visual Experiments*, 7(81), e50980. DOI: 10.3791/50980 (November 2013).

- Co-authors: Armon Sharei, doctoral student in the Langer and Jensen laboratories; Nahyun Cho, undergraduate researcher in the Jensen laboratory; Shirley Mao, undergraduate researcher in the Jensen laboratory; Emily Jackson, undergraduate researcher in the Jensen laboratory; Roberta Poceviciute, doctoral student in the Jensen laboratory; Andrea Adamo, research scientist in the Jensen laboratory; Robert Langer, faculty peer in the department of Chemical engineering and the the Koch Institute at Massachusetts Institute of Technology; Klavs F. Jensen, faculty peer in the Department of Chemical Engineering at Massachusetts Institute of Technology.
- Statement of contribution: Together with Armon Sharei and Andrea Adamo, I developed the microfluidic device. I focused on adjusting the microfluidic device structure to biological applications; as such, I designed and performed all cell-based experiments as well as trained students and researchers. I took a critical role in writing and revising the manuscript.

Section 2. Works published (or in equivalent status) while in current rank at other institutions

Not applicable.

Section 3. Works published (or in equivalent status) while in previous rank(s) at UT Austin

Not applicable.

Section 4. Works published (or in equivalent status) while in previous rank(s) at other institutions

1. Armon Sharei[+], Janet Zoldan[+], Andrea Adamoa[+], Woo-Young Sim, Nahyun Cho, Emily Jackson, Shirley Mao, Sabine Schneider, Min-Joon. Han, Abigail Lytton-Jean, Pamela A. Basto, Siddharth Jhunjhunwala, Jungmin Lee, Daniel A. Heller, Jeon-Woong Kang, George C. Hartoularos, Kwang-Soo. Kim, Daniel G. Anderson, Robert Langer, and Klavs F. Jensen, A vector-free microfluidic platform for intracellular delivery", *Proceedings of the National Academy of Sciences of the United States of America*, 110(6), p. 2082-2087. DOI: 10.1073/pnas.1218705110 (January 2013). [+]Equal contribution.
2. Iris Shichor, Noam Shomron, Michael W. Lawlor, Seul A. Bae, Janet Zoldan, Robert Langer, and Daniel S. Kohane, Toxicogenomic analysis of a sustained release local anesthetic delivery

system", *Biomaterials*, 33(13), p. 3586-3593. DOI: 10.1016/j.biomaterials.2012.01.043 (May 2012).

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Table 2. External Grants and Contracts Awarded in Rank - Current

Role of Candidate and Co-Investigators	Title	Agency	Project Total	Candidate's Share	Grant Period
PI	Ischemia therapy via temporally controlled differentiation of induced pluripotent stem cells into vascular networks	American Heart Association	$308,000	$308,000	07/2015 - 06/2019
PI	Promoting Neurovascularization Following Stroke	Alliance for Regenerative Rehabilitation Research and Training (AR3T)	$100,000	$100,000	07/2018-06/2020
PI	Painting Vasculature with Photosensitive Liposomes	NIH – NIBIB	$622,715	$537,052	09/2019-05/2022
TOTAL			$1,030,715	$945,052	

Table 3. External Grants and Contracts Awarded in Rank - Completed

Role of Candidate and Co-Investigators	Title	Agency	Project Total	Candidate's Share	Grant Period
TOTAL					

Table 4. Proposals for External Grants and Contracts Submitted in Rank - Pending

Role of Candidate and Co-Investigators	Title	Agency	Project Total	Candidate's Share	Grant Period
PI	Printing in situ cues for blood vessel formation using light patterning of photosensitive liposomes	American Heart Association	$200,000	$200,000	07/01/2019-06/30/2023 Not funded -resubmit
PI	Connexin Based Biomaterial For Cardiac Tissue Integration	Welch Foundation	$195,000	$195,000	06/01/2019-05/31/2022 Not funded
PI	Tunable biomaterials for regulating the vasculogenic potential of iPSC-derived vascular progenitor cells	NIH	$1,884,030	$1,884,030	09/01/2019-08/31/2024 Not funded-resubmit
PI	Connexin-based biomaterial for coupling engineered tissue	NIH	$609,731	$609,731	09/01/2019-08/31/2022 Not funded-resubmitted
PI	A microfluidic delivery approach to metabolically control cardiac differentiation and maturation	NSF	$298,412	$298,412	04/01/2019-03/31/2022 Under review
PI- Zoldan Co-I – Dunn (BME)	Temporally controlled differentiation of iPSCs into vascular networks for inducing neurovascularization in stroke models	NIH	$2,179,750	$1,969,610	09/01/2018-08/31/2023 Not funded -resubmit
PI-Ben Yakar (Mechanical Engineering/Biomedical Engineering) Co-I-Zoldan	Line excitation array detection (LEAD) fluorescence microscopy for ultrafast 3D flow cytometry	NIH	$1,482,838	$200,000	09/01/2019-08/31/2024 Not funded -resbmit

PI-Zoldan Co-PI-Ben Yakar (Mechanical Engineering/Biomedical Engineering)	A High-Throughput System for Patient Specific Cardiotoxicity Assessment of Anti-Cancer Drugs	CPRIT	$1,941,644	$1,060,567	09/01/2019-08/31/2023 Under review
TOTAL			**$8,791,045**	**$6,417,350**	

COCKRELL SCHOOL OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

Department of Biomedical Engineering • 107 W Dean Keeton, Stop C0800 • Austin, Texas 78712
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Department of Biomedical Engineering Budget Council Statement on Teaching

Candidate: Dr. **Janeta Zoldan, Ph.D., Assistant Professor**

Prepared by: Dr. Nicholas A. Peppas Sc.D.

Dr. Nicholas Peppas was appointed by Dr. Shelly Sakiyama-Elbert, Chair of the Department of Biomedical Engineering, to evaluate the teaching of Professor Janet Zoldan. The Budget Council has carefully considered all aspects of Dr. Zoldan's teaching and course evaluations and concludes that Professor Zoldan meets the teaching expectations set forth by the Cockrell School of Engineering and The University of Texas at Austin.

While in rank Professor Zoldan has established herself as a leader in teaching undergraduate and graduate courses in biomaterials and tissue engineering. Professor Zoldan has taught two undergraduate and one graduate course over a period of ten semesters. More specifically she has taught BME 352 "Engineering Biomaterials", BME 379 "Tissue Engineering" and BME 382J "Stem Cells: Cell and Tissue Engineering"

Dr. Zoldan's CIS instructor/course evaluation scores for the courses she has taught:

Course	Semester	Students	Overall Instructor Rating/ BME Average/ CSE Average	Overall Course Rating/ BME Average/ CSE Average
BME 379; CHE 339T; BME 382J	Fall 2014	28; 6; 5 (total 37)	3.7/ 4.0/ 4.1	3.5/ 3.7/ 3.9
BME 382J; BME 337T	Spring 2015	2; 8 (total 10)	4.9/ 4.1/ 4.2	4.9/ 3.9/ 3.9
BME 379	Fall 2015	24; 9; 11 (total 44)	3.5/ 3.9/ 4.1	3.6/ 3.6/ 3.9
BME 382J; BME 337T	Spring 2016	11; 11 (total 22)	4.4/ 4.0/ 4.2	4.1/ 3.6/ 3.9
BME 352	Fall 2016	100	3.1/ 4.1/ 4.2	3.0/ 3.8/ 3.9
BME 379; CHE 339T	Spring 2017	18; 11 (total 29)	4.1/ 3.9/ 4.1	4.1
BME 379	Fall 2017	(total 19)	4.4/ 3.9/ 4.1	4.3/ 3.6/ 3.9
BME 352	Spring 2018	(total 48)	4.4/ 4.1/ 4.2	4.1/ 3.8/ 3.9
BME 379	Fall 2018	(total 24)	4.4/ 3.9/ 4.1	4.3/ 3.6/ 3.9
BME 352	Spring 2019	(total 42)	4.0/ 4.1/ 4.2	3.8/ 3.8/ 3.9

In the Fall 2014 she taught BME 379, "Tissue Engineering", an elective course cross-listed also to Chemical Engineering (CHE 339T). This course could be taken by selected BME graduate students as a graduate course (BME 382J). She repeated this course in the Fall 2016. An overall evaluation by 37 and 44 BME and CHE undergraduate and graduate students, respectively, gave ratings of 3.7 and 3.5. These ratings were somewhat below the BME teaching average. However, numerous individual comments praised the course and Dr Zoldan's teaching style. A few comments concentrated on the fact that exams did not seem to follow the teaching material and homework was not related to the exact material covered in the lectures concerns that were corrected in subsequent courses. Other areas where improvement was needed included availability for students' comments and timely arrival to class so that students could perhaps interact with Dr. Zoldan before and after class. This was corrected and students have ample time to talk with her. By the time she taught again BME 352 (Spring 2018 and Spring 2019), Dr. Zoldan had become and expert teacher with scores of 4.0 and 4.4. A similar pattern has been observed in BME 379 which improved significantly (score of 4.4 in Fall 2019 vs 3.7 in Fall 2014).

Professor Zoldan taught a new graduate course she personally developed, BME 382J, Stem Cells: Cells and Tissue Engineering. She taught it twice to 10 and 22 BME and ChE graduate students and had consistently very good to excellent teaching performance with ratings as high as 4.9. In the Fall 2016 she taught her largest class up to now, a required BME course on Biomaterials (BME 352). The performance here was less than desirable with a student rating of 3.1 and a course rating of 3.0. This was Professor Zoldan's first UT experience in teaching a large lecture class. Following significant interaction with the BME Chair and teaching mentors, she improved her performance in large classes.

Dr. Zoldan has had peer evaluations by Drs. Diller (BME 379, November 2018), Milner (BME 382J, November 2015), Peppas (BME 352, November 2016; February 2018; March 2019), Rylander (BME 379, March 2017), and Suggs (BME 379, November 2017). In his comments, Dr Diller indicated that Dr Zoldan was "very well organized" and "very engaging". In his 2015 evaluation, Dr Milner noted that his "observation indicates Janet is committed to student learning, that students participate in her class and that her teaching might improve with a louder and more direct delivery. In his 2018 evaluation, Dr Peppas indicated," …very careful presentation of difficult material, excellent pedagogy, concern for the students". Dr. Suggs noted in her 2017 evaluation: "Good content knowledge (I have previously taught this course and am well-qualified to assess this.) Major strength was giving a variety of learning opportunities including Power Point, active learning strategies, and individual guided practice. Students were engaged and appeared to keep their discussion on topic". Finally, Dr. Rylander in his 2017 report summarized Dr. Zoldan's teaching style as "energetic, knowledgeable, professional and engaging". And he concluded: "Dr. Zoldan is an excellent teacher".

In summary, Dr. Zoldan is recognized as an effective and highly successful teacher who receives consistently high marks for her teaching.

Teaching Statement

Overview

Lectures and laboratory courses play an important role in developing competitive skill sets that students need to succeed in research and their future endeavors. As a professor, I have a great opportunity to shape the education of future biomedical engineers by sharing my knowledge and experience with both graduate and undergraduate students through mentoring and teaching. I have always believed that most students can flourish under the right learning environment, and it is my job as a teacher to provide such an environment. I aim to create a stimulating, comprehensive, and organized environment in classrooms and in laboratories where my students can reach their full potential.

Philosophy for Undergraduate Teaching

I am passionate about teaching, at all levels, and believe that professors are in the unique and enviable position to inspire young minds to take up the most pressing societal problems. My teaching philosophy is two-fold. First, I believe students in biomedical engineering should have strong foundations in the principles and practice of core engineering and science subjects. For instance, students should be adept at framing basic balance laws and constitutive equations, possess the requisite tools to solve mathematical systems and be comfortable with analytical frameworks. Indeed, it is these quantitative perspectives on biology that distinguish biomedical engineers. With that said, problems pertaining to the life sciences are extraordinarily broad and interdisciplinary; thus, the second component of my teaching philosophy is my belief in infusing the curriculum with creative, open-ended, and hands-on subject offerings. Accordingly, my philosophy is to encourage students to be independently curious, to seek out new and unconventional problems, and to instill in them the confidence to ask the right questions and rapidly prototype effective design solutions.

Experience and Innovation in Teaching

BME 379: Tissue Engineering (cross-listed with CHE 339T: Cell and Tissue Engineering and BME 382J: Cell and Tissue Engineering)

Since starting my position at UT Austin, I have taught this class five times. This course is an introduction to the field of tissue engineering, and it is the first time that undergraduate students (and some graduate students) encounter this subject. Professor Laura Suggs was the previous instructor for BME 379, and I benefited tremendously from receiving her notes and advice on the course. I set two main objectives of this course, which aligned with my teaching philosophy: (I) apply knowledge of biological and physical sciences, mathematics, and engineering to solve problems at the intersection of engineering and biology, and (II) be able to design a tissue engineering component and/or process that meets specific needs.

One of the challenges that I have teaching this course is the inhomogeneous student body, comprised of three different groups of students with diverse backgrounds and knowledge levels: graduate students, undergraduate BME students, and students from other departments. Therefore, the first innovation that I implemented in this course is to divide it into four segments. The first three segments of the course are focused on introducing the basic principles of tissue engineering (cells, scaffolds, and stimulus), to ensure that all students are on the same level. The last course segment is dedicated to innovative examples of tissue engineering. I decided to emphasize the biological side of tissue engineering by adding new components on tissue morphogenesis during embryonic development and cell signaling, as well as engineering concepts related to scaffold design such as the controlled release of signal delivery and the use of micropatterning techniques. I also put enormous effort into emphasizing the last segment of the course, which I believe is the highlight of the course. In this section of the course, students can see how each of the concepts we covered during the semester come together to solve a tissue engineering problem. I make sure to update this segment each time I teach this course to expose students to the most recent developments in tissue engineering. The second innovation in my teaching was to implement a theme I call, "Hot From the Press". As the field of tissue engineering is very dynamic, sometimes breakthroughs are reported before we reach the last section of the course, and so I pause the scheduled progression of the course and present the highlights of the breakthrough. As this course is also cross-listed with the graduate-level course BME 382J: Cell and Tissue Engineering, I decided that the requirements for graduate students would be to present and submit a written research proposal that describes a tissue engineering solution to a specific tissue of their choice. The third innovation in my teaching was to incorporate graduate students' presentations within the last section of the course. Most students who take this course are involved in some aspect of the tissue engineering field and propose to present their thesis project. These presentations expose undergraduate students to the tissue engineering research pursued in the department, while graduate students, usually in their first year, get to enhance

their knowledge on their thesis subject as well as practice their presentations skills. The entire class is then involved in grading the presentation based on a pre-made rubric that I give them. Having a role in grading the presentations ensures that students remain involved and engaged during these presentations.

Response to student feedback: I taught this course for the first time in Fall 2014; the class was relatively small, and I believe I was able to connect with each student individually through class discussions and meetings during office hours. Students performed well, and class evaluation scores were close to college levels. After teaching this class, I realized that the course was missing lectures on cell migration as well as on how the body reacts to implantation of cell and/or biomaterials. I implemented these changes the next time I taught this class, which was in Fall 2015. However, having a large group of graduate students in the class made the last section strenuous. This was reflected in the course evaluation scores, which decreased compared to the previous year's. In Spring 2017, I implemented students' suggestions to have homework assignments for the class, refocused my lecture notes, used a microphone in lectures and made sure that graduate student presentations did not take over the last section of the course. I also implemented a fourth innovation in my teaching: touring my laboratory. After introducing students to embryonic and induced pluripotent stem cells, they were divided into groups of 10 students, and we toured my laboratory. I shortly outlined research programs in my laboratory while students were watching the beating of live cardiomyocytes, derived from human induced plunpotent stem cells. Many students told me later that this was the first time they had seen a stem cell. Since then and in the next two times I taught this course, students continuously reported a positive experience as evidenced by the above college level ratings this course received. Some of the students who took this course went on to take my advanced graduate-level course Stem Cell: Cell and Tissue Engineering. I have stayed in touch with many of the undergraduate students, who mostly seek my advice on career choices. I try to help as much as I can by connecting them to my academic and industrial network.

BME 382J: Stem Cells: Cells and Tissue Engineering (cross-listed with BME 377T: Stem Cells: Cells and Tissue Engineering)

After teaching the introductory tissue engineering course, I designed this advanced graduate-level course as a direct continuum with a complete focus on human-induced and embryonic plunpotent stem cells. The expectation is that students who take this class have the basic knowledge of the principles of tissue engineering, allowing us to delve into specific examples of how induced and embryonic plunpotent stem cells are used to engineer tissue parts of the human body. Each week is devoted to a different tissue part. The innovative teaching that I implemented was that the first class of the week is an introduction to the specific tissue structure and primary challenges associated with engineering this tissue, and the second class is devoted to two recently published clinical or scientific breakthroughs in this area. Depending on the size of the class, each student presents one or two scientific manuscripts to the class, and then I lead a discussion about the manuscript during the class, analyzing the results and conclusion made by authors. At the end of the discussion, students are prompted to share what they learned and what were the strengths and weaknesses of the manuscript they presented. As a final assignment, students are required to write and present an NIH-style proposal based on their idea for a tissue engineering stem cell-based therapy for a tissue or cell that was not covered in class.

The innovative idea for structuring this course is based on my own experience. As a new graduate student, I found understanding and analyzing scientific manuscripts a Herculean task. Thus, the objectives of this course are: (I) to be able to analyze scientific manuscripts and communicate effectively in verbal and written formats, and (II) be familiar with the forefront of stem cell-based tissue engineering research. I believe this type of course develops the students' confidence, imparts best research practices, and, most importantly, fosters the development of critical thinking. Both juniors and incoming graduate students have benefited from taking this course. Some of the juniors told me later that they used their class proposal to apply for the National Science Foundation graduate research fellowships, and that my comments were highly constructive. Additionally, graduate students have used their class proposals for their qualifying examination and to develop new avenues in their research.

Response to student feedback: Student perception of this course is highly positive. I received some outstanding notes from students who took this course, as evidenced by the high, well-above college level ratings this course received both times I taught it. I have attached two examples. Last time I taught this course, a student suggested adding checkpoints for tracking students' progress on their final proposal, which I plan to implement next time I teach this course.

BME 352: Engineering Biomaterials

This is an introductory-level material science and biomaterials course. One of the inherent difficulties in teaching an introductory course is the fast pace and continuous change in class subjects. The objective of this course is to acquire basic concepts of biomaterial design and application. I taught this course for the first time in Fall 2016, as a one-time replacement for Professor Laura Suggs during her sabbatical. Therefore, I made very few

changes to the curriculum. Although I received numerous teaching awards as a teaching assistant for a similar course during my graduate studies, my teaching capabilities were challenged. I believe that this was a result of a combination of factors: it was my first time teaching this course, my first time teaching 100 students, and the first time that the course was mandatory for all BME majors. The next time I taught this course, in Spring 2018, I implemented several innovations. First, I infused the course with hands-on experiments to convey subjects that I felt were better comprehended with a real example, in line with my teaching philosophy. For example, to explain elastic and plastic deformation, I used a paper clip bending exercise with the entire class; for crystallography, students built models from marshmallows and toothpicks; for viscoelasticity, the whole class made silly putty to visualize the meaning of viscoelasticity. I also restructured the course to first cover basic concepts in material science, transition into different types of biomaterials and lastly focus on applications of biomaterials. In this last section, I implemented a second innovation, discussing recent scientific manuscripts to demonstrate biomaterials applications. The final project in the course was to choose a biomedical device or implant that has or is being developed for commercial use, identify its drawbacks, and propose an alternative biomaterial to improve it. Students were encouraged to contact manufacturers, locate patent documents, and to come up with creative solutions. This exercise allowed the students to apply their knowledge of biomaterial properties to a real-life problem of material selection. The third innovation I implemented was to set up a time to meet students individually (or in groups of 2-3 students) for a casual conversation. For many of these students, it was the first time a professor sat down and just talked with them.

Response to student feedback: The changes I made to the curriculum were positively perceived by the students, as evidenced by their evaluations. Based on students' comments, I decided this semester (Spring 2019) to continue innovation in teaching: I added more discussion sessions throughout the semester. I also added two short videos to increase student interest and engagement. During the class on the periodic table, we watched Professor Martyn Poliakoff's periodic videos, where his team performs explosion-based experiments with elements of the periodic table. Then, during the class on 3D printing, we watched segments of Professor Joseph DeSimon's TEDtalk when he unveiled his new 3D printing technique. Additionally, I implemented active learning concepts, which I learned at the 2017 National Effective Teaching Institute workshop in Philadelphia, PA. Specifically, to encourage discussion of a chosen scientific manuscript, the class was divided into groups of 5-7 students. I then presented a question related to the manuscript and allowed the groups to answer it within a set time frame. This was followed by a discussion comparing the different answers each group had. These discussion sessions developed the students' critical thinking while exposing them to scientific breakthroughs. Based on the student comments, while many reported a positive experience ("phenomenal instructor"; "I learned a lot"; "very open to questions and knowledgeable"; "made me even more excited about biomaterials"; "encourages thought-provoking discussion"), a few expressed concern about my absences during the semester. With the growth of my research program, I have received an increasing number of invitations to give external lectures. However, I have been careful to keep my number of missed classes below the limits set by the Cockrell school, which is 6 classes per semester for a MWF course. All extra material presented in guest lectures was posted on Canvas, and I made sure to have additional office hours to answer questions in the week following my trips. The next time I teach this course, I will focus the discussion sessions to the last section of the course, make sure that homework keys are published on time and hold mid-term surveys to identify issues students have before the end of the semester.

"The Doctor is in the house" seminar series

I have established a new seminar series in the department, called "The doctor is in the house". These seminars bring a clinical perspective to Biomedical Engineers. Each seminar is led by a physician to introduce the basic clinical features of a specific medical field, present the current challenges, and have an open discussion on how biomedical engineers can impact this field. Early communication with physicians is important to identify the right problem and potentially establish interdisciplinary teams that can significantly advance health care solutions and improve patients' quality of life. The "Doctor is in the house" seminar series generated significant excitement among our faculty and students. Highlights include the seminars given by Dr. Robert Buchanan (Chief of Neurosurgery, Brain and Spine Institute, Seton) and by Dr. Steven Abrams (Director of the Dell Pediatric Research Institute). Dr. Abrams' seminar was followed by a mixer with physicians from Seton, providing a valuable networking opportunity for our department. Undergraduate students who were planning to attend medical school were extremely excited to have these seminar series and interactions with physicians. Many of them thanked me for establishing this seminar series. Overall these seminars have helped forge strong ties with the Dell Medical School (DMS), leading to the formation of new collaborations between our faculty and DMS physicians. Also, many DMS physicians are now participating in the department's senior design projects. This past year half of the projects our students worked on as their senior design projects were initiated by DMS physicians.

Mentoring Students Through Research

Since starting my laboratory at UT Austin, I have already worked with two postdoctoral scholars, five graduate students, 25 undergraduates, and a high school student in the laboratory. I consider guiding students through the excitement of new discoveries and the difficulties of failed experiments and watching them become mature and professional scientists, to be the biggest privileges a professor can have. I strive to provide my students with a stimulating and collegial environment for them to work at the cutting edge of research. I take a very personal interest in mentoring my students through weekly one-hour meetings. I have an "open-door policy", and often students meet with me 3-5 times over the week, particularly during experimental segments involving new procedures where more guidance is required. Additionally, there is a scheduled bi-monthly group meeting in which students present their findings to their peers in the laboratory; this is a valuable exercise to develop scientific discussions, as well as critical scientific presentation skills in preparation for presenting experimental findings at academic conferences.

My first goal is to teach my students basic laboratory techniques in molecular cell biology, embryonic stem cell culture, engineering biomaterials, and developing drug delivery systems. We next work on developing their research skills: formulating a hypothesis and experimental design (controls, repeats, statistics), followed by results analysis. I strive to develop in them a flexible way of thinking and encourage them to troubleshoot when experiments do not work or do not follow the expected route and generally think "outside of the box". Once their scientific skills have developed, I encourage them to come up with new ideas or directions and guide them to follow through. During the summer, we do not have group meetings; instead, we have initiated a journal club. All members of my laboratory meet once a week to take turns in presenting their choice for a recent breakthrough in stem cell tissue engineering. I believe that these meetings prompt scientific discussions, keep everyone up to date with current, on-going science around the world, and broaden their scientific background. To explore what other groups outside of our department are doing, last summer, I hosted PIs from the Institute for Cellular and Molecular Biology and Dell Pediatric Research Institute along with their group members. The PIs gave a short overview of their research focus, and then we engaged in Post-it note poster presentations where each student presented their research on a Post-it note. These presentations force the students to develop their verbal communication skills and describe their research in lay terms. This summer we will be hosting PIs from Chemical and Mechanical Engineering.

I encourage the scholarly development of my students. To develop scientific writing skills and broaden their knowledge in the field of stem cell tissue engineering, I make sure that they participate in writing review papers. I provide funds and expect them to travel once a year to an appropriate scientific conference to present their experimental data. I also encourage the students to publish these findings in peer-reviewed journals. We set yearly academic and professional goals and ways to accomplish them. While these goals often change, these discussions help students to plan ahead and evaluate career choices.

To aid in the research progress and provide a useful mentorship experience for graduate students' and postdoctoral fellows' future careers, I encourage my students to train undergraduate researchers. In addition to gaining extra hands for experimental preparation, this allows them to learn valuable mentorship skills, as well as hone their knowledge by answering a wide array of questions. As an indication of their valuable work, almost all undergraduate trainees have received the UT Austin's Undergraduate Research Fellowship.

Teaching Training

I am eager to continuously improve my teaching skills in any way I can. A few examples:

- Professors Thomas Milner, George Georgiou, Nicholas Peppas, Grady Rylander, Laura Suggs, and Ken Diller have each provided highly valuable feedback on my teaching based on in-class observation.
- I often discuss teaching strategies with professors Ken Diller, Laura Suggs, and Jeanne Stachowiak.
- I was chosen to represent the Cockrell School of Engineering at the 2017 National Effective Teaching Institute workshop for new faculty members at the ASEE meeting in Philadelphia, PA.

Date June 2019

Janet Zoldan's Summary of Teaching

Table 1. Summary of Course-Instructor Ratings at UT Austin

Metric	Value
Total number of students taught in organized courses	376
Average instructor rating for undergraduate courses	4 16
Average instructor rating for graduate courses	5 0
Average course rating for undergraduate courses	4 03
Average course rating for graduate courses	5 0

Table 2. Course Schedule by Semester at UT Austin

Course	F 14	S 15	F 15	S 16	F 16	S 17	F 17	S 18	F 18	S 19
BME 379	37		45			29	19		24	
BME 377T		8		22						
BME 382J		2								
BME 352					100			48		42

Table 3. Summary of Graduate Students Currently Supervised at UT Austin

Student Name	Co-Supervisor	Degree	Start Date	Date Reached Candidacy	Date Expected to Reach Candidacy	Expected Graduation Date
Cody O Crosby	None	PhD	09/2015	02/2017	N/A	Fall 2020

NOTES

(1) Provide the name of the co-supervisor and their home department (if not the same as the candidate)

Janet Zoldan
Department of Biomedical Engineering
Course Rating Averages

Tenure candidates must include all years in rank.
All other candidates must include, at minimum, the three most recent years
What source was used to complete this chart? _____ My CIS
(e.g. My CIS, summary provided by Provost's Office, etc.)

Course Number: Course Name: BME 352 Engineering Biomaterials

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Fall 2016	100	76	3.1	3.0
Spring 2018	48	42	4.4	4.1
Spring 2019	42	35	4.0	3.8
Mean	**63**	**51**	**3.8**	**3.6**

Course Number: Course Name:BME 379 Tissue Engineering

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Fall 2014	37	32	3.7	3.5
Fall 2015	45	29	3.5	3.6
Spring 2017	29	19	4.1	4.1
Fall 2017	19	18	4.4	4.3
Fall 2018	24	20	4.4	4.3
Mean	**31**	**24**	**4.0**	**4.0**

Janet Zoldan
Department of Biomedical Engineering
Course Rating Averages

Course Number: Course Name:BME 377T Stem Cells: Cells& Tissue Engineer

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Spring 2015	8	7	4.9	4.9
Spring 2016	22	22	4.4	4.1
Mean	**15**	**15**	**4.7**	**4.5**

Course Number: Course Name:BME 382J Stem Cells: Cells& Tissue Engineer

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Spring 2015	2	2	5	5.0
Mean	**2**	**2**	**5.0**	**5.0**

Ins Avg UG	4.16
Course Avg UG	4.03
Ins Avg Grad	5.00
Course Avg Grad	5.00

CONFIDENTIAL

Course Instructor Survey Results

Name/EID ZOLDAN, JANETA (jz7998)
Department Biomedical Engineering
Report Date 08-30-2019

Semester	Unique Number	Course Number	Course Title	Instruction Type	Enrollment	No of Surveys Returned	Avg Overall Instructor Rating	Avg Overall Course Rating
Fall 2014	14675	BME 379	TISSUE ENGINEERING	Organized	37	32	3 7	3 5
Spring 2015	14123	BME 377T	STEM CELLS CELL & TISSUE ENGR	Organized	8	7	4 9	4 9
Spring 2015	14177	BME 382J	STEM CELLS CELL & TISSUE ENGR	Organized	2	2	5	5
Fall 2015	14255	BME 379	TISSUE ENGINEERING	Organized	45	29	3 5	3 6
Spring 2016	14275	BME 377T	STEM CELLS CELL & TISSUE ENGR	Organized	22	22	4 4	4 1
Fall 2016	14205	BME 352	ENGINEERING BIOMATERIALS	Organized	100	76	3 1	3
Spring 2017	14290	BME 379	TISSUE ENGINEERING	Organized	29	19	4 1	4 1
Fall 2017	14230	BME 379	TISSUE ENGINEERING	Organized	19	18	4 4	4 3
Spring 2018	13405	BME 352	ENGINEERING BIOMATERIALS	Organized	48	42	4 4	4 1
Fall 2018	14330	BME 379	TISSUE ENGINEERING	Organized	24	20	4 4	4 3
Spring 2019	14130	BME 352	ENGINEERING BIOMATERIALS	Organized	42	35	4	3 8

Case 1:19-cv-00877-RP Document 69-34 Filed 02/23/22 Page 58 of 171

UT Austin_0024814

Biomedical Engineering

Peer Evaluation
for the Formative Assessment of Teaching[1]

Faculty Evaluated: Janet Zoldan

Current Rank: Asst Professor

Date of Evaluation: 4/28/15

Course Observed: BME **382J STEM CELLS: CELL & TISSUE ENGR**

		Not Observed	Needs Improvement	Done Well	Truly Exemplary
Course Content					
1	Presented main ideas clearly	☐	☐	X	☐
2	Provided variety of supporting information	☐	☐	X	☐
3	Clearly addressed relevancy of main ideas	☐	☐	☐	X
4	Required higher order thinking by students	☐	☐	X	☐
5	Related ideas to students' prior knowledge	☐	☐	X	☐
6	Provided definitions for new terms/concepts	X	☐	☐	☐
Organization					
7	Connected introduction to previous classes	☐	☐	X	☐
8	Stated organization/objectives	☐	☐	X	☐
9	Used clear, effective transitions with summaries	☐	☐	X	☐
10	Had a clear and organized plan	☐	☐	☐	X
11	Concluded by summarizing main ideas	☐	☐	☐	X
12	Connected to future classes/courses/expectations	X	☐	☐	☐
Interaction					
13	Questioned students at different learning levels	X	☐	☐	☐
14	Provided sufficient wait time after asking questions	☐	☐	X	☐
15	Encouraged student questions	☐	☐	X	☐
16	Gave informative responses to questions	☐	☐	☐	X
17	Had good rapport/engagement with students	☐	☐	X	☐
Verbal/Nonverbal					
18	Was confident and enthusiastic	☐	☐	☐	X
19	Used clear articulation and pronunciation	☐	☐	X	☐
20	Avoided verbalized pauses (e.g., "uh," "ah," etc.)	☐	☐	X	☐
21	Spoke extemporaneously	☐	☐	X	☐
22	Minimized any distracting accent/language	☐	☐	X	☐
23	Projected voice to be easily heard	☐	☐	X	☐
24	Used appropriate pace of delivery	☐	☐	X	☐
25	Made adequate eye contact with varied students	X	☐	☐	☐
Use of Media					
26	Used classroom technology proficiently	☐	☐	X	☐
27	Made visual aids easy to read	☐	☐	☐	X
28	Provided effective outline/handouts	☐	☐	☐	X
Overall Rating					
Overall, I rate this instructor's performance as: (**Circle one**)		Deficient	Satisfactory	Very Good X	Excellent

NARRATIVE EVALUATION
Use additional sheet(s) as necessary

Strengths [e.g., apparent knowledge of curriculum preceding and following the presented material, positive feedback to students, opportunity provided for student questions, relevant engineering examples, etc.]:

See below

Areas for Improvement [e.g., inability to answer student questions, deficiencies in content knowledge, absence of examples/irrelevant examples, difficulties with student rapport, etc.]:

The only improvement I would recommend would be to provide a clear summary of caveats for each of the case studies (ie research papers) covered in class.

Additional Comments beyond Lecture [e.g., correlation between exam questions and learning objectives, reflection on and incorporation of previous review, and suggestions for improvement in teaching, etc.]:

In the class I attended Dr. Zoldan discussed state of the art material on the topic of scaffolds for stem cell differentiation/development by presenting relevant information from top recent research papers. She based her lecture on a ppt slide deck, which clearly outlined the key relevant issues. She was very well organized and displayed enthusiasm about the material. The students appeared very engaged, asking many questions and discussing key points.

OVERALL ASSESSMENT:

Dr. Zoldan actively encouraged interactions and while challenging the students to come up with their own conclusions and answers to questions would step in when appropriate to set the tone and to provide an authoritative view of the topic being discussed. It was clear that the students were enjoying the class and were fully engaged.

Date of Course: Spring 2015_____ Observer Signature

George Georgiou

[1] Form based on E. Porter, D.K. Meyer & A.S. Hagen *The Journal of Staff, Program, & Organization Development*, Vol. 12, No. 2, Fall 1994, pp. 104-105

Updated February 6, 2015

Teaching Observation of Janet Zoldan
evaluated and discussed November 12,
2015

In the Fall Semester of 2015 I observed Janet Zoldan teaching a graduate level Cell and Tissue Engineering course (BME 382J). The class is taught solely by Dr. Zoldan and meets for seventy-five minutes on Tuesdays and Thursdays in NOA 1.102 between 12:30-13:45PM. The class is composed of BME undergraduates (25), BME graduate students (11) and Chemical Engineering undergraduates (9) for a total of 45 students. When I observed Janet, about 35 students were present in the classroom.

During the lecture I observed, the topic Janet addressed was Cardiovascular Tissue Engineering. Janet made extensive use of PowerPoint slides to present lecture material. Most students had a laptop computer and followed the lecture by viewing the slides on their laptop. Janet started the lecture by briefly discussing a recent publication describing a new paradigm for Hematopoiesis and the implications for understanding and working with stem cells. After describing the content of the publication, one student asked about a potential implication of the paper which was confirmed and discussed by Janet.

Janet started the lecture by presenting the implications of cardiovasoular disease on public health and then briefly presented the anatomy of the heart's arterial system. She then discussed the primary symptoms associated with Cardiovascular disease and the consequences. After presenting the effect of a myocardial infarction on the heart, Janet asked the question "...as a tissue engineer what would you do?" Students responded by making various suggestions that led into the main content of the lecture: 1) vascular grafts; 2) angiogenesis; and 3) tissue regrowth by cardiomyocytes. After introducing and setting these three topics, Janet then lectured on each topic.

My observation of Janet in the classroom suggests that she is a good teacher with a number of positives and few minor areas that might be improved. On the positive side, Janet's presentation was clear and most of the students followed the material. Janet engaged the class well with questions and subsequent discussion. She connected with the class and students demonstrated an interest in the material and participated in the discussion. Janet's presentation of the material and in particular the introduction provided students the contextual framework for the relevance and importance of the subject material. Areas where some improvement might be realized include increasing her voice level (possibly using a microphone in large classrooms) and decreasing the number of pauses that are frequently interjected with "ahh...." These are minor issues that can be readily addressed. In summary, my observation indicates Janet is committed to student learning, that students participate in her class and that her teaching might improve with a louder and more direct delivery.

Thomas Milner
Professor of Biomedical Engineering

The University of Texas at Austin
Biomedical Engineering
Cockrell School of Engineering

Peer Evaluation
for the Formative Assessment of Teaching[1]

Faculty Evaluated: Jarhat Zoldan Current Rank: Assistant Professor

Date of Evaluation: 11/18/16 Course Observed: BME 352

		Not Observed	Needs Improvement	Done Well	Truly Exemplary
Course Content					
1.	Presented main ideas clearly	☐	☐	☐	☒
2.	Provided variety of supporting information	☐	☐	☐	☒
3.	Clearly addressed relevancy of main ideas	☐	☐	☐	☒
4.	Required higher order thinking by students	☐	☐	☒	☐
5.	Related ideas to students' prior knowledge	☐	☐	☐	☒
6	Provided definitions for new terms/concepts	☐	☐	☐	☒
Organization					
7.	Connected introduction to previous classes	☐	☐	☐	☒
8	Stated organization/objectives	☐	☐	☐	☒
9.	Used clear, effective transitions with summaries	☐	☐	☐	☒
10	Had a clear and organized plan	☐	☐	☐	☒
11.	Concluded by summarizing main ideas	☐	☐	☐	☒
12.	Connected to future classes/courses/expectations	☐	☐	☐	☒
Interaction					
13.	Questioned students at different learning levels	☐	☐	☐	☒
14.	Provided sufficient wait time after asking questions	☐	☐	☐	☒
15.	Encouraged student questions	☐	☐	☒	☐
16.	Gave informative responses to questions	☐	☐	☐	☒
17.	Had good rapport/engagement with students	☐	☐	☐	☒
Verbal/Nonverbal					
18	Was confident and enthusiastic	☐	☐	☐	☒
19	Used clear articulation and pronunciation	☐	☐	☐	☒
20	Avoided verbalized pauses (e.g., "uh," "ah," etc.)	☐	☐	☐	☒
21.	Spoke extemporaneously	☐	☐	☐	☒
22	Projected voice to be easily heard	☐	☐	☐	☒
23	Used appropriate pace of delivery	☐	☐	☐	☒
24.	Made adequate eye contact with varied students	☐	☐	☐	☒
Use of Media					
25.	Used classroom technology proficiently	☐	☐	☐	☒
26.	Made visual aids easy to read	☐	☐	☐	☒
27.	Provided effective outline/handouts	☐	☐	☐	☒

Overall Rating

Overall, I rate this instructor's performance as. (Circle one) Deficient Satisfactory Very Good (Excellent)

An exceptional teacher! Thoroughly enjoyed her lectures!

NARRATIVE EVALUATION
Use additional sheet(s) as necessary

Strengths [e.g., apparent knowledge of curriculum preceding and following the presented material, positive feedback to students, opportunity provided for student questions, relevant engineering examples, etc.]:

Jenet Zoldan is an expert teacher with a broad background and well polished style!

Areas for Improvement [e.g., inability to answer student questions, deficiencies in content knowledge, absence of examples/irrelevant examples, difficulties with student rapport, etc.]:

None! Truly exceptional delivery.

Additional Comments beyond Lecture [e.g., correlation between exam questions and learning objectives, reflection on and incorporation of previous review, and suggestions for improvement in teaching, etc.]:

I was truly impressed how she kept 60+ students excited. She was discussing bypass surgery, heart lung machines, etc. and the students were listening to every word!

OVERALL ASSESSMENT:

Exceptional!

Date of Course: 11/18/16 Observer Signature: Nicholas Peppas

[1] Form based on S. Porter, D.K. Meyer, & A.S. Hagen, *The Journal of Staff Program & Organization Development*, Vol. 12, No. 2, Fall 1994, pp. 104-105

Updated September 14, 2016

The University of Texas at Austin
Biomedical Engineering
Cockrell School of Engineering

Peer Evaluation
for the Formative Assessment of Teaching[1]

Faculty Evaluated: Janet Zoldan Current Rank: Assistant Professor

Date of Evaluation: 3-9-2017 Course Observed: BME 379 (Cell and Tissue Engineering)

		Not Observed	Needs Improvement	Done Well	Truly Exemplary
Course Content					
1.	Presented main ideas clearly	☐	☐	☐	X
2.	Provided variety of supporting information	☐	☐	X	☐
3.	Clearly addressed relevancy of main ideas	☐	☐	☐	X
4.	Required higher order thinking by students	☐	☐	☐	X
5.	Related ideas to students' prior knowledge	☐	☐	X	☐
6.	Provided definitions for new terms/concepts	☐	☐	☐	X
Organization					
7.	Connected introduction to previous classes	☐	☐	X	☐
8.	Stated organization/objectives	☐	☐	☐	X
9.	Used clear, effective transitions with summaries	☐	☐	X	☐
10.	Had a clear and organized plan	☐	☐	☐	X
11.	Concluded by summarizing main ideas	☐	☐	X	☐
12.	Connected to future classes/courses/expectations	☐	☐	X	☐
Interaction					
13.	Questioned students at different learning levels	☐	☐	X	☐
14.	Provided sufficient wait time after asking questions	☐	☐	X	☐
15.	Encouraged student questions	☐	☐	☐	X
16.	Gave informative responses to questions	☐	☐	☐	X
17.	Had good rapport/engagement with students	☐	☐	☐	X
Verbal/Nonverbal					
18.	Was confident and enthusiastic	☐	☐	☐	X
19.	Used clear articulation and pronunciation	☐	☐	☐	X
20.	Avoided verbalized pauses (e.g., "uh," "ah," etc.)	☐	☐	X	☐
21.	Spoke extemporaneously	☐	☐	☐	X
22.	Projected voice to be easily heard	☐	☐	X	☐
23.	Used appropriate pace of delivery	☐	☐	X	☐
24.	Made adequate eye contact with varied students	☐	☐	☐	X
Use of Media					
25.	Used classroom technology proficiently	☐	☐	☐	X
26.	Made visual aids easy to read	☐	☐	☐	X
27.	Provided effective outline/handouts	☐	☐	☐	X
Overall Rating					
Overall, I rate this instructor's performance as: (Circle one)		Deficient	Satisfactory	Very Good	Excellent

NARRATIVE EVALUATION
Use additional sheet(s) as necessary

Strengths (e.g., apparent knowledge of curriculum preceding and following the presented material, positive feedback to students, opportunity provided for student questions, relevant engineering examples, etc.):

BME 379 (Cell and Tissue Engineering) is a combined graduate/undergraduate class taught in the pharmacy building. On the observation day, 19 students were in attendance. Two main topics were discussed: cell response to different scaffolds and controlled drug release. Scaffolds discussed included natural biomaterials, synthetic biomaterials and synthetic biomaterials with bioactive species. Cell response to the mechanical stiffness of the scaffolds was discussed in detail. Controlled drug release began by considering established modes of drug delivery and the advantages and disadvantages of each. A thoughtful discussion of therapeutic index, efficacy, and potency led naturally to the topic of controlled drug release from matrix and reservoir type structures. The history of smart biomaterials was particularly engaging with antidotal stories of Jeff Hubbie and Bob Langer. Overall, the students (and I) were engaged throughout the lecture.

Dr. Zoldan faced the students and delivered the lecture without notes. She frequently asked questions to ascertain that the material was being understood. Questions were addressed throughout the lecture in a straightforward fashion without intimidating the students. The PPTX slides were easy to read and contained content reinforcing the lecture. Effective use of videos tied the engineering principles to clinical applications. The attention level and student participation during the class was excellent. The rhetorical dimension was excellent with appropriate time spent asking and answering questions.

Areas for Improvement (e.g., inability to answer student questions, deficiencies in content knowledge, absence of examples/irrelevant examples, difficulties with student rapport, etc.):

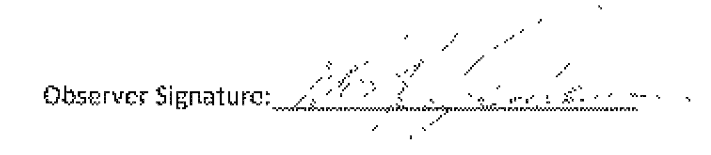
None

Additional Comments beyond Lecture (e.g., correlation between exam questions and learning objectives, reflection on and incorporation of previous review, and suggestions for improvement in teaching, etc.):

In summary, as an outside observer, I came away with a better understanding of engineering cellular scaffolds and controlled drug release. Words that describe her teaching style include: energetic, knowledgeable, professional, and engaging. Dr. Zoldan is an excellent teacher.

Updated September 14, 2016

OVERALL ASSESSMENT: Dr. Zoldan's teaching is a strong asset of the BME Department and CSE.

Date of Course: __3-9-2017 Observer Signature: 

H. Grady Rylander, III, MD

[1] Form based on E. Porter, D.K. Meyer & A.S. Hagen *The Journal of Staff, Program & Organization Development*, Vol. 12, No. 2, Fall 1994, pp. 104-108

The University of Texas at Austin
Biomedical Engineering
Cockrell School of Engineering

Peer Evaluation
for the Formative Assessment of Teaching[1]

Faculty Evaluated: __Janet Zoldan_____ Current Rank:___Asst. Prof._____

Date of Course __11/2/2017_____ Course Observed:__BME 379_____

		Not Observed	Needs Improvement	Done Well	Truly Exemplary
Course Content					
1	Presented main ideas clearly	☐	☐	x	☐
2	Provided variety of supporting information	☐	☐	☐	x
3	Clearly addressed relevancy of main ideas	☐	☐	☐	x
4	Required higher order thinking by students	☐	☐	x	☐
5	Related ideas to students' prior knowledge	☐	☐	☐	x
6	Provided definitions for new terms/concepts	x	☐	☐	☐
Organization					
7	Connected introduction to previous classes	☐	☐	x	☐
8	Stated organization/objectives	☐	☐	x	☐
9	Used clear, effective transitions with summaries	☐	☐	x	☐
10	Had a clear and organized plan	☐	☐	x	☐
11	Concluded by summarizing main ideas	☐	☐	x	☐
12	Connected to future classes/courses/expectations	☐	☐	x	☐
Interaction					
13	Questioned students at different learning levels	☐	☐	☐	x
14	Provided sufficient wait time after asking questions	☐	☐	☐	x
15	Encouraged student questions	☐	☐	x	☐
16	Gave informative responses to questions	☐	☐	x	☐
17	Had good rapport/engagement with students	☐	☐	x	☐
Verbal/Nonverbal					
18	Was confident and enthusiastic	☐	☐	☐	x
19	Used clear articulation and pronunciation	☐	☐	x	☐
20	Avoided verbalized pauses (e g , "uh," "ah," etc)	☐	☐	x	☐
21	Spoke extemporaneously	☐	☐	x	☐
22	Projected voice to be easily heard	☐	x	☐	☐
23	Used appropriate pace of delivery	☐	☐	x	☐
24	Made adequate eye contact with varied students	☐	☐	☐	x
Use of Media					
25	Used classroom technology proficiently	☐	☐	☐	x
26	Made visual aids easy to read	☐	☐	x	☐
27	Provided effective outline/handouts	☐	☐	☐	x
Overall Rating					
Overall, I rate this instructor's performance as: (Circle one)		Deficient	Satisfactory	Very Good	Excellent

NARRATIVE EVALUATION
Use additional sheet(s) as necessary

Strengths [e.g., apparent knowledge of curriculum preceding and following the presented material, positive feedback to students, opportunity provided for student questions, relevant engineering examples, etc.]:

Dr. Zoldan arrived in plenty of time to get set up. The topic was a review/ discussion of the upcoming exam. She asked if there were any questions before beginning. She then proceeded to organize them into groups for discussion. I observed her utilize a number of active learning tools to guide their review and check learning including: "pair and share," direct questioning and asking volunteers to come to the board to draw. She used power points to guide discussion but did not overly rely on them. I observed that all students had pulled up notes on their laptops in order to work problems and were engaged. She gave ample time for students to work and canvassed the room to help individual groups. I also observed her pull in an unpaired student into a group.

Areas for Improvement [e.g., inability to answer student questions, deficiencies in content knowledge, absence of examples/irrelevant examples, difficulties with student rapport, etc.]:

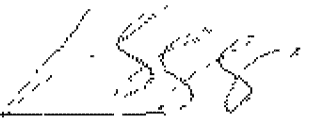
Dr. Zoldan's spoken volume is a little low for the back of the room. May want to look into using a microphone or amplification device. Also, it may be useful to vary the pacing of the class and/or break up class with a video or demo in the middle.

Additional Comments beyond Lecture [e.g., correlation between exam questions and learning objectives, reflection on and incorporation of previous review, and suggestions for improvement in teaching, etc.]:

I thought that students appeared very relaxed and engaged. It was good to also write student-volunteered answers on the board to give multiple avenues for questioning/ understanding.

OVERALL ASSESSMENT:

Good content knowledge (I have previously taught this course and am well-qualified to assess this.) Major strength was giving a variety of learning opportunities including powerpoints, active learning strategies, and individual guided practice. Students were engaged and appeared to keep their discussion on topic.

Date of Conference with Faculty: __11/2/17_____ Observer Signature: 
Laura J. Suggs

[1] Form based on E. Porter, D.K. Meyer & A.S. Hagen *The Journal of Staff, Program, & Organization Development*, Vol. 12, No. 2, Fall 1994, pp. 104-105

UPDATED SEPTEMBER 14, 2016

The University of Texas at Austin
Biomedical Engineering
Cockrell School of Engineering

Peer Evaluation
for the Formative Assessment of Teaching[1]

Faculty Evaluated: [illegible] Current Rank: [illegible]

Date of Course [illegible] Course Observed: [illegible]

		Not Observed	Needs Improvement	Done Well	Truly Exemplary
Course Content					
1.	Presented main ideas clearly	☐	☐	☑	☐
2.	Provided variety of supporting information	☐	☐	☐	☑
3.	Clearly addressed relevancy of main ideas	☐	☐	☐	☐
4.	Required higher order thinking by students	☐	☐	☑	☐
5.	Related ideas to students' prior knowledge	☐	☐	☐	☐
6.	Provided definitions for new terms/concepts	☐	☐	☐	☐
Organization					
7.	Connected introduction to previous classes	☐	☐	☐	☑
8.	Stated organization/objectives	☐	☐	☐	☑
9.	Used clear, effective transitions with summaries	☐	☐	☑	☐
10.	Had a clear and organized plan	☐	☐	☑	☐
11.	Concluded by summarizing main ideas	☐	☐	☐	☑
12.	Connected to future classes/courses/expectations	☐	☐	☐	☑
Interaction					
13.	Questioned students at different learning levels	☐	☐	☑	☐
14.	Provided sufficient wait time after asking questions	☐	☐	☐	☑
15.	Encouraged student questions	☐	☐	☐	☑
16.	Gave informative responses to questions	☐	☐	☐	☑
17.	Had good rapport/engagement with students	☐	☐	☐	☑
Verbal/Nonverbal					
18.	Was confident and enthusiastic	☐	☐	☐	☑
19.	Used clear articulation and pronunciation	☐	☐	☐	☑
20.	Avoided verbalized pauses (e.g., "uh," "ah," etc.)	☐	☐	☐	☑
21.	Spoke extemporaneously	☐	☐	☐	☑
22.	Projected voice to be easily heard	☐	☐	☑	☐
23.	Used appropriate pace of delivery	☐	☐	☐	☑
24.	Made adequate eye contact with varied students	☐	☐	☐	☑
Use of Media					
25.	Used classroom technology proficiently	☐	☐	☐	☑
26.	Made visual aids easy to read	☐	☐	☐	☑
27.	Provided effective outline/handouts	☐	☐	☐	☑
Overall Rating					
Overall, I rate this instructor's performance as: (Circle one)		Deficient	Satisfactory	Very Good	Excellent

NARRATIVE EVALUATION
Use additional sheet(s) as necessary

Strengths [e.g., apparent knowledge of curriculum preceding and following the presented material, positive feedback to students, opportunity provided for student questions, relevant engineering examples, etc.]:

Strong presentation of the basic of network research in preparation for biomedical.

Areas for Improvement [e.g., inability to answer student questions, deficiencies in content knowledge, absence of examples/irrelevant examples, difficulties with student rapport, etc.]:

None

Additional Comments beyond Lecture [e.g., correlation between exam questions and learning objectives, reflection on and incorporation of previous review, and suggestions for improvement in teaching, etc.]:

OVERALL ASSESSMENT:

Very comfort presentation of difficult material. Excellent pedagogy. Concern for the students.

Date of Conference with Faculty: 2/19/18 Observer Signature: [signature]

Obeserver Printed Name: [illegible]

[1] Form based on E. Porter, D.K. Meyer & A.S. Hagen. *The Journal of Staff, Program, & Organization Development*, Vol 12, No. 2, Fall 1994. pp. 104-105.

Updated: September 14, 2016

The University of Texas at Austin
Biomedical Engineering
Cockrell School of Engineering

Peer Teaching Evaluation Form

Faculty Name (to be evaluated):	Current Rank:	Observer Name:
Janet Zoldan	Asst Prof	Ken Diller
Date of Course Observation:	**Course Name:**	**Course Number:**
11/20/18 Last lect	Tissue Engr	BME 379
Greatest Strengths – please list:		
Speaking is clear, logical, interesting lecture	Pushing students to think independently	
holds student interest	in groups	
with hand/chalk [illegible] spkr,	Students divided into small groups	2 times for discussing/reporting
Areas for development – please list:		
could [illegible] with chalk		

Course Observation Notes

based on issues observer deems as appropriate or important from past evaluations or CIS results

Skill	Evident?	Notes
Advanced planning and preparation for class	PowerPoint lect well done video clip	Very well organized. Presented [illegible]. Students well [illegible]. students [illegible] material [illegible]
Actively asssessing students understanding of the materials	Very engaging during discussion	

Creating tangible outcomes		
Creating an environment for learning that fosters collegiality and exploration of new thoughts		
Establishing a partnership with students		
Using questions effectively to stimulate students' thinking and learning		
Generates thoughtful questions from students		
Modeling of principles of application and methodology		

Updated: February 21, 2018

Promoting self-directed learning		
Facilitating group discussion	attempted in group 2,	

Additional Observations:

Very good discussion to facilitate for understanding rather than just note material coverage

Date of Conference with Faculty: Nov 29 2018

Observer Signature

Observer Printed Name: Ken Diller

The University of Texas at Austin
Biomedical Engineering
Cockrell School of Engineering

Peer Evaluation
for the Formative Assessment of Teaching

Faculty Evaluated: Zoldan Current Rank: Asst Prof

Date of Course 11/20/18 Course Observed: E7D

		Not Observed	Needs Improvement	Done Well	Truly Exemplary
Course Content					
1.	Presented main ideas clearly	☐	☐	☐	☐
2	Provided variety of supporting information	☐	☐	☐	☐
3.	Clearly addressed relevancy of main ideas	☐	☐	☐	☐
4.	Required higher order thinking by students	☐	☐	☐	☐
5.	Related ideas to students' prior knowledge	☐	☐	☐	☐
6.	Provided definitions for new terms/concepts	☐	☐	☐	☐
Organization					
7	Connected introduction to previous classes	☐	☐	☐	☐
8	Stated organization/objectives	☐	☐	☐	☐
9.	Used clear, effective transitions with summaries	☐	☐	☐	☐
10.	Had a clear and organized plan	☐	☐	☐	☐
11.	Concluded by summarizing main ideas	☐	☐	☐	☐
12.	Connected to future classes/courses/expectations	☐	☐	☐	☐
Interaction					
13.	Questioned students at different learning levels	☐	☐	☐	☐
14.	Provided sufficient wait time after asking questions	☐	☐	☐	☐
15.	Encouraged student questions	☐	☐	☐	☐
16.	Gave informative responses to questions	☐	☐	☐	☐
17.	Had good rapport/engagement with students	☐	☐	☐	☐
Verbal/Nonverbal					
18.	Was confident and enthusiastic	☐	☐	☐	☐
19.	Used clear articulation and pronunciation	☐	☐	☐	☐
20.	Avoided verbalized pauses (e.g., "uh," "ah," etc.)	☐	☐	☐	☐
21.	Spoke extemporaneously	☐	☐	☐	☐
22.	Projected voice to be easily heard	☐	☐	☐	☐
23	Used appropriate pace of delivery	☐	☐	☐	☐
24.	Made adequate eye contact with varied students	☐	☐	☐	☐
Use of Media					
25.	Used classroom technology proficiently	☐	☐	☐	☐
26	Made visual aids easy to read	☐	☐	☐	☐
27.	Provided effective outline/handouts	☐	☐	☐	☐

Overall Rating	Deficient	Satisfactory	Very Good	Excellent
Overall, I rate this instructor's performance as: (Circle one)				

this entire evaluation criterion is irrelevant & useless. I do not use it, KZ

NARRATIVE EVALUATION
Use additional sheet(s) as necessary

Strengths [e.g., apparent knowledge of curriculum preceding and following the presented material, positive feedback to students, opportunity provided for student questions, relevant engineering examples, etc.]:

Areas for Improvement [e.g., inability to answer student questions, deficiencies in content knowledge, absence of examples/irrelevant examples, difficulties with student rapport, etc.]:

Additional Comments beyond Lecture [e.g., correlation between exam questions and learning objectives, reflection on and incorporation of previous review, and suggestions for improvement in teaching, etc.]:

OVERALL ASSESSMENT:

Date of Conference with Faculty:

Observer Signature:

Observer Printed Name:

[1] Form based on E. Porter, D.K. Meyer & A.S. Regen. *The Journal of Staff, Program, & Organization Development*, Vol. 12, No. 2, Fall 1994, pp. 104-105

Updated: September 14, 2016

The University of Texas at Austin
Biomedical Engineering
Cockrell School of Engineering

Peer Evaluation
for the Formative Assessment of Teaching[3]

Faculty Evaluated: Janet Zoldan Current Rank: Asst. Professor

Date of Evaluation: 4/12/19 Course Observed: BME 352

		Not Observed	Needs Improvement	Done Well	Truly Exemplary
Course Content					
1.	Presented main ideas clearly	☐	☐	☒	☐
2.	Provided variety of supporting information	☐	☐	☒	☐
3.	Clearly addressed relevancy of main ideas	☐	☒	☐	☐
4.	Required higher order thinking by students	☐	☐	☒	☐
5.	Related ideas to students' prior knowledge	☐	☐	☐	☒
6.	Provided definitions for new terms/concepts	☐	☐	☐	☒
Organization					
7.	Connected introduction to previous classes	☐	☐	☐	☒
8.	Stated organization/objectives	☐	☐	☐	☒
9.	Used clear, effective transitions with summaries	☐	☐	☒	☐
10.	Had a clear and organized plan	☐	☐	☐	☒
11.	Concluded by summarizing main ideas	☐	☐	☒	☐
12.	Connected to future classes/courses/expectations	☐	☐	☐	☐
Interaction					
13.	Questioned students at different learning levels	☐	☐	☐	☒
14.	Provided sufficient wait time after asking questions	☐	☐	☒	☐
15.	Encouraged student questions	☒	☐	☐	☐
16.	Gave informative responses to questions	☐	☐	☐	☐
17.	Had good rapport/engagement with students	☐	☐	☒	☐
Verbal/Nonverbal					
18.	Was confident and enthusiastic	☐	☐	☒	☐
19.	Used clear articulation and pronunciation	☐	☐	☐	☐
20.	Avoided verbalized pauses (e.g., "uh," "ah," etc.)	☐	☐	☐	☒
21.	Spoke extemporaneously	☐	☐	☐	☐
22.	Projected voice to be easily heard	☐	☐	☐	☐
23.	Used appropriate pace of delivery	☐	☐	☐	☐
24.	Made adequate eye contact with varied students	☐	☐	☐	☐
Use of Media					
25.	Used classroom technology proficiently	☐	☐	☐	☒
26.	Made visual aids easy to read	☐	☐	☐	☒
27.	Provided effective outline/handouts	☐	☐	☐	☒
Overall Rating					
Overall, I rate this instructor's performance as: (Circle one)		Deficient	Satisfactory	Very Good	Excellent

NARRATIVE EVALUATION
Use additional sheet(s) as necessary

Strengths [e.g., apparent knowledge of curriculum preceding and following the presented material, positive feedback to students, opportunity provided for student questions, relevant engineering examples, etc.].

Areas for Improvement [e.g., inability to answer student questions, deficiencies in content knowledge, absence of examples/irrelevant examples, difficulties with student rapport, etc.]:

Additional Comments beyond Lecture [e.g., correlation between exam questions and learning objectives, reflection on and incorporation of previous review, and suggestions for improvement in teaching, etc.][1]

OVERALL ASSESSMENT:

Why were there only 15 students? Difficult class to attend?

Date of Course: 1/13/19 Observer Signature: Nicholas Peppas

[1] Form based on E. Porter, D.K. Meyer & A.S. Hagen *The Journal of Staff Programs & Organization Development*, Vol. 12, No. 2, Fall 1994, pp. 104-106.

Updated: November 4, 2015

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Case 1:19-cv-00877-RP Document 69-34 Filed 02/23/22 Page 78 of 171

COMMITTEE REPORT, MASTERS AND DOCTORAL
FOR ZOLDAN, JANETA

STUDENT NAME	EID	LAST CCYYS ENRL	COMM POSITION	MAST OR DOCT	1ST DEGREE	FIELD	CCYYS	2ND DEGREE	FIELD	CCYYS
ALLEN, ALICIA CAITLIN B.	aca364	20182	CHAIR	D	PH.D.	BIOMEDICAL ENGINEE	20182			
AYOUB, SALMA	sa35798	20192	MEMBER	D	PH.D.	BIOMEDICAL ENGINEE	20182			
BAEK, KIHEON	kb36389	20192	MEMBER	D	PH.D.	BIOMEDICAL ENGINEE	20192			
BUIE, TANEIDRA WALKER	tlw3283	20199	MEMBER	D						
CROSBY, CODY O'KEEFE	coc367	20199	CHAIR	D						
DHADA, KABIR SINGH	ksd822	20196	MEMBER	D	PH.D.	BIOMEDICAL ENGINEE	20196			
DHAYALKAR, PRACHI S.	psd482	20199	MEMBER	D						
GADOK, AVINASH KAUR	akg882	20172	MEMBER	D	PH.D.	BIOMEDICAL ENGINEE	20172			
GEUSS, LAURA ROSEVE	lrg534	20146	MEMBER	D	PH.D.	CELL AND MOLECULAR	20146			
GRIES, PAUL JAMES	pjg597	20199	MEMBER	D						
HENDERSON, KAYLA BRIANA	kbh947	20199	MEMBER	D						
HUANG, WENBAI	wh7446	20199	MEMBER	D						
IMAM, ZACHARY IBRAHIM	zxx58	20186	MEMBER	D	PH.D.	BIOMEDICAL ENGINEE	20186			
JOAQUIN, ALYSA MARIE	aj24243	20169	CHAIR	M	M.S.E.	BIOMEDICAL ENGINEE	20169			
JOYCE, MARSHALL HUNTER	mj8342	20189	MEMBER	D	PH.D.	BIOMEDICAL ENGINEE	20189			
LEE, JAEWON	jl162688	20199	MEMBER	D						
NOBLETT, ALEXANDER DAVID	adn595	20199	MEMBER	D						
PETERS, JONATHAN THOMAS	jtp865	20159	MEMBER	D	PH.D.	CHEMICAL ENGINEERI	20159			
RICLES, LAURA MICHELLE	lmr572	20146	MEMBER	D	PH.D.	BIOMEDICAL ENGINEE	20146			
RYTLEWSKI, JULIE ANN	jar862	20139	MEMBER	D	PH.D.	BIOMEDICAL ENGINEE	20139			
SHARPE, LINDSEY ANNE	las4367	20172	MEMBER	D	PH.D.	BIOMEDICAL ENGINEE	20172			
SHODEINDE, AALIYAH B.	abs3244	20199	MEMBER	D						
TU, CHENGYI	ct25844	20186	CHAIR	D	PH.D.	BIOMEDICAL ENGINEE	20186			

UT Austin_0024834

COMMITTEE REPORT, MASTERS AND DOCTORAL
FOR ZOLDAN, JANETA

STUDENT NAME	EID	LAST CCYYS ENRL	COMM POSITION	MAST OR DOCT	1ST DEGREE	FIELD	CCYYS	2ND DEGREE	FIELD	CCYYS
VARDHAN, SANGAMITHRA	sv34265	20199	MEMBER	D						
VAUGHN, AMANDA KRISTIN	av9459	20196	MEMBER	D	PH.D.	BIOCHEMISTRY	20196			
WHITE, NICHOLAS SHADRACH	nw8354	20199	MEMBER	D						
ZHAO, CHI	cz3387	20199	MEMBER	D						

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Case 1:19-cv-00877-RP Document 69-34 Filed 02/23/22 Page 79 of 171

UT Austin_0024835

List of Supervised Postdoctoral Fellows – Janeta Zoldan

- Wei Deng, PhD - 12/2015-06/2018
  - PhD from Guangzhou Institute of Biomedicine and Health, Chinese Academy of Sciences, 07/2011
  - Currently seeking opportunities in Data Science Analytics

- Nima Momtahan, PhD – 10/2018 – present
  - PhD from Brigham Young, Chemical Engineering, 04/2016

COCKRELL SCHOOL OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

Department of Biomedical Engineering • 107 W Dean Keeton, Stop C0800 • Austin, Texas 78712
(512) 471-3604 • FAX (512) 471-0616

Department of Biomedical Engineering Budget Council Statement on Research, Publications and other Evidence of Scholarship and Creativity

Candidate **Dr. Janet Zoldan, Ph.D. Assistant Professor**

Prepared by **Dr. Elizabeth Cosgriff-Hernandez, Ph.D. & Dr. Laura J. Suggs, Ph.D.**

Drs Elizabeth Cosgriff-Hernandez and Dr Laura J Suggs were appointed by Dr Shelly Sakiyama-Elbert, Chair of the Department of Biomedical Engineering, to evaluate the research of Professor Janet Zoldan The Budget Council considered all aspects of Dr Zoldan's research, publications, and scholarship

Professor Zoldan has established herself as a leader in cardiovascular tissue engineering Her work, while in rank, seeks to develop tools to control differentiation, maturation, and translational development of pluripotent stem cells for tissue regeneration Within the field of regenerative medicine, culture systems have been developed to drive differentiation of early cardiovascular progenitors A major gap in the field, however, is the development of robust tissue constructs that express terminally differentiated function Dr Zoldan seeks to address this gap through an understanding of the role that understudied environmental cues like substrate organization, metabolic status, and cell connectivity play on cell maturation Ultimately, this knowledge may serve to provide translational approaches for treating disease, and by bridging this gap, she sets herself up with a unique research program relative to her peers who are either focused on chemical or genetic signals to drive cell function One of her external reviewers, David Kaplan states, "These studies are highly significant, as we remain very much in the dark on how physical cues, in synergy with biochemical factors, orchestrate cell fate and function"

Dr Zoldan's research program has two primary thrusts The first is in the area of the development of cardiac tissue from pluripotent stem cells In this area, she has made important discoveries regarding (1) the role that matrix alignment plays in development of a functional cardiac syncytium as well as (2) how alterations in cell metabolism can drive maturation The role of matrix alignment is evidenced in the publication, "A Allen, E Barone, N Momtahan, C O Crosby, C Tu, W Deng, K Polansky, J Zoldan, "Temporal impact of substrate anisotropy on differentiating cardiomyocyte alignment and functionality", Tissue Engineering, Part A" This work provides a roadmap for matrix design to control cell alignment in cardiac patches Dr Zoldan has also established a significant body of work looking at directly altering cell metabolism in order to drive cardiac development This work was described in original research articles as well as in a review paper titled, "The role of reactive oxygen species in in-vitro cardiac maturation" This work received media attention and was highlighted by *Muscle Cell News* and in *Trends in Molecular Medicine*

A second thrust is in the area of modulating hydrogel biomaterials for controlling vascular network development The latter area is the first description of how vascular progenitor cells derived from pluripotent stem cells can be organized by modulating hydrogel physical properties Dr Zoldan's strengths are in coupling a deep understanding of the biologic processes of stem cell differentiation and organization with an ability to precisely engineer material substrates and delivery systems Evidence of the importance of matrix organization is described in the publication, "C O Crosby and J Zoldan, "Mimicking the physical cues of the ECM in angiogenic biomaterials", Regenerative Biomaterials, 6(2), p 61-73" Her research work on this topic was also recently chosen as part of a Special Issue on "Engineered Tissues Derived from Induced-Pluripotent Stem Cells (iPSCs) for Disease Modeling, Drug Discovery, and Replacement Therapies in Tissue Engineering" in the journal, Tissue Engineering

Professor Zoldan has published 19 manuscripts in rank with a career total of 34 publications and an associated H index of 13 (Google Scholar) She served as corresponding author on 10 of these publications of which 6 are research publications in high quality journals, two are invited reviews, one is a methods article, and one is an invited commentary Notably (and, importantly), these papers are in highly respected journals including, for example, Integrative Biology (IF = 3 23) Biomaterials Science (IF = 5 80), Stem Cell Research (IF = 3 92), Experimental Cell Research (IF = 3 23), Tissue Engineering Part A (IF = 3 62) These contributions are being recognized at an increasing rate as manifested by her increasing citation numbers and H-index

Dr Zoldan's scholarly record demonstrates the breadth of her research collaborations at UT and across multiple institutions Her core research articles advance induced-pluripotent stem cells therapies by engineering materials to improve control of stem cell fate. A recent commentary article from her group summarizes how it is possible to use environment cues to drive cell differentiation and maturation in order to advance disease understanding and treatment "C Tu and J Zoldan, "Moving iPSC-derived cardiomyocytes forward to treat myocardial infarction," Cell Stem Cells, 23(3), p 322-323" (IF = 21 46) This commentary was invited by a pioneer in the field of cardiac tissue engineering and speaks to her role as a thought leader In his external review, William Wagner states that this, "provide strong evidence of Dr Zoldan's emerging leadership role as a scholar in her field"

During her time at UT, Professor Zoldan has presented 15 invited talks and seminars (20 overall), which is notable at this stage of her career and demonstrates that she has gained a strong reputation in the regenerative medicine community She has also published 33 conferences presentations and 2 provisional patents while at UT Dr Zoldan was also recently invited to present this exciting work at the 8th International Conference on Bioengineering and Nanotechnology, Society for Biological Engineering, 2019 Furthermore, she has been invited to present numerous times at peer universities including Rice University, UC Irvine, Tufts University, University of Wisconsin and Cornell University

Professor Zoldan has submitted 10-12 research proposals per year to both federal and private funding agencies As a result of these continued efforts, she has received the Scientist Development Grant from the American Heart Association ($308,000) and the Alliance of Regenerative Rehabilitation Research and Training award ($100,000) She is also the recent recipient of an NIH NIBIB Trailblazer award ($622,715) that will support her future research

efforts She has received in excess of $1M in grant funding and has also had several additional grants that received excellent scores close to the threshold of funding (NIH 15% pay-line 10%, impact score of 22 pay-line 17, DoD impact score 1 8 pay-line 1 6) As the nature of her stem cell research requires a significant time investment to establish these complex systems, she is now seeing that investment pay dividends Prof Antonios Mikos from Rice University commented that, "There can be no doubt that her continued productivity in biomedical engineering research will focus creatively on issues of central importance"

In summary, Dr Zoldan is recognized as one of the most productive Assistant Professors with respect to research scholarship on our faculty Dr Zoldan has developed a robust and productive research program and has demonstrated potential for continuation The Budget Council concludes that Dr Zoldan meets the expectations for research scholarship, publication, and creativity to be promoted to Associate Professor

Research Statement

Summary

- Received the Scientist Development Grant from the American Heart Association
- Received the Alliance of Regenerative Rehabilitation Research and Training award
- Published 19 peer-reviewed journal articles at UT Austin (34 overall)
- Published and presented 33 conference proceedings/abstracts at UT Austin (55 overall)
- Presented 15 invited talks while at UT Austin (20 overall)
- Filed two provisional patents while at UT Austin (3 overall)
- Named as 2017 Emerging Young Investigator by *Biomaterials Science*
- Our work was selected to be part of a Special Issue on Engineered Tissues Derived from Induced-Plunpotent Stem Cells (iPSCs) for Disease Modeling, Drug Discovery, and Replacement Therapies in *Tissue Engineering*
- Invited to write a commentary in *Cell Stem Cells*
- Invited to write a review on extracellular matrix-like biomaterials in *Regenerative Biomaterials*
- Invited to write a review on cardiac maturation in *Trends in Molecular Medicine*
- Selected as a member of the Scientific Advisory Board for the Tissue Engineering and Regenerative Medicine International Society World Congress

Overview

My research at The University of Texas at Austin is at the intersection of material science and stem cell bioengineering. Using induced pluripotent stem cells (iPSCs) as a model system to explore key principles underlying cardiovascular tissue formation processes, I aim to control cell fate with material design to treat cardiovascular disease

A central problem in cell and tissue engineering is the limited understanding of tissue formation processes. Understanding these processes and controlling them is critical for treating a broad spectrum of pathological conditions (e.g., peripheral arterial diseases, stroke, and heart failure) as well as alleviating the current shortage of donor tissue necessary for tissue repair and transplant. Generally, the formation of tissue is carried out on at least two levels: 1) cell differentiation and 2) interactions between cells and their matrix. iPSCs have unique characteristics that render them a powerful tool for studying these processes. First, iPSCs are capable of renewing themselves for long periods through cell division. Second, they can be induced to differentiate into all of the cell types that constitute the body, providing a strong basis for the design of patient-specific stem cell-based therapies. However, the current challenge is controlling differentiation processes and inducing their assembly into cardiovascular tissues.

To unlock the full therapeutic potential of these cells, I, therefore, design 3D matrixes that create a cellular microenvironment presenting myriad controllable signals more representative of the natural developmental process compared to the 2D surfaces used in conventional tissue culture. These matrixes are engineered using biomaterials to tune the physical, chemical, and biological properties as control signals. Specifically, my research program is centered around <u>two goals</u> (i) **deciphering the role of physical cues in the complex process of iPSC differentiation into cardiovascular lineages** and (ii) **developing microenvironments favorable for cardiovascular tissue formation.** These engineered environments serve as a platform for fundamental research in tissue development, disease mechanisms, and drug testing. Collectively this work has the potential to provide solutions for *in situ* tissue regeneration applications.

(i) <u>Deciphering the role of physical cues in cardiac differentiation and maturation.</u>

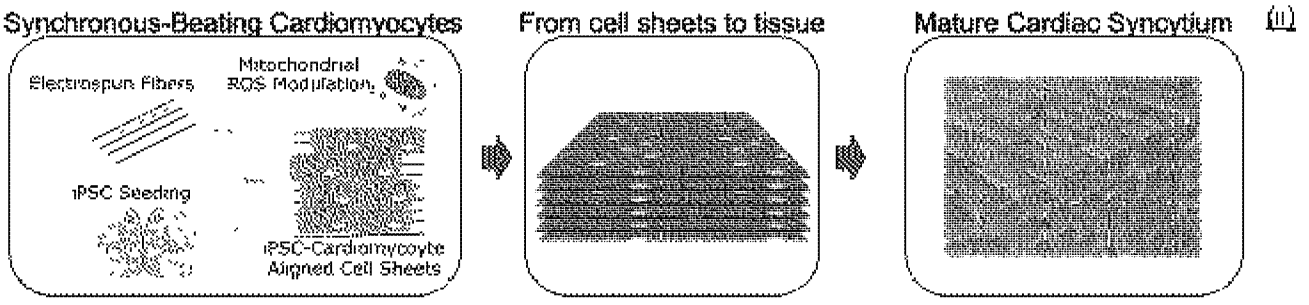

Figure 1: Engineering a mature cardiac syncytium via cell alignment and mitochondrial reactive oxygen species (ROS) modulation

Despite great advancements in cardiac differentiation in the past two decades, the challenge of producing functionally mature cardiomyocytes that can integrate with host tissue remains. My group's effort in this area has focused on engineering a cardiac syncytium: a cardiac tissue in which cells are electromechanically coupled, enabling them to function as a single unit. A key feature of cardiac tissue that enables this syncytium is cell alignment, allowing contraction and propagation of signals in one direction.

Researchers have heavily relied on biochemical approaches to drive cardiac differentiation, primarily through modulation of the Wnt pathway. While successful in improving differentiation efficiencies, cardiomyocytes functional maturity remains a challenge. The most noticeable omission in these protocols is biophysical cues, like those derived from extracellular matrix (ECM) alignment. Cardiomyocyte contractility is highly dependent on cell shape, and cardiomyocyte alignment improves contractile and electrophysiological function in ways that cannot be reproduced biochemically. This phenomenon has been mostly studied in single mature cell systems but applies to cell monolayers and tissue-like constructs. Nevertheless, most differentiation methods and 3D biomaterials do not introduce topographical cues that promote cell alignment. To fill this gap, we set out to incorporate anisotropic cues into the cardiac differentiation microenvironment using electrospun polycaprolactone fiber scaffolds. Electrospinning readily generates micro- and nano-fibers that mimic the ECM structure. Utilizing electrospinning processes, we can control matrix anisotropy and generate fiber scaffolds with a range of degrees of orientation to decipher how and when cells respond to microenvironment anisotropy. Our results with cardiac differentiation on these fiber scaffolds demonstrate that differentiating cardiomyocytes are responsive to substrate anisotropy. Cardiomyocyte alignment initially varies with substrate anisotropy in a gradient-based manner. Over time, overall cardiomyocyte alignment is dependent on a minimum threshold anisotropy of the underlying substrate. Most significantly, cellular alignment during the differentiation processes led differentiating cardiomyocytes to beat in a synchronized manner at early time points, when these cells are still immature (Allen and Zoldan, *Tissue Engineering Part A*, 2019). To our knowledge, this is the first demonstration that cardiac cell maturity can be decoupled from synchronized beating. Our work reinforces the importance of introducing anisotropic cues into the microenvironment of differentiating cardiomyocytes, specifically in modulating the structure and the resulting function of stem cell-derived cardiomyocyte. Microenvironment anisotropy is critical to improving the synchronization of cardiomyocyte beating, which is necessary to move cardiac stem cell-based therapy into the clinic. Such an understanding of how matrix anisotropy influences stem cell-derived cardiomyocyte function will have significant future applications in the development of cardiac tissue therapies and in studying the mechanisms that lead to lack of synchronized beating (arrhythmia development). Building on this work, we are currently investigating the mechanisms that lead to synchronized beating, looking into the role of cell-cell and cell-matrix interactions by identifying adhesion proteins and perturbing cell-cell communication.

Based on these results, we next introduced alignment into cell sheets using electrospun Poly(N-isopropylacrylamide) based fiber scaffolds to further develop the concept of a cardiac syncytium (i.e., a cardiac tissue in which cells are electromechanically coupled). We postulate that aligned fiber scaffolds will serve as a template for cardiomyocytes' alignment as they form cell sheets; aligned cardiac cell sheets will beat synchronously, preventing electrical heterogeneity associated with current cell-based therapies and thereby improve coupling with the host myocardium. Poly(N-isopropylacrylamide) is a thermosensitive polymer that undergoes a rapid coil-to-globule transition below its lower critical solution temperature (LCST) of 32° C. Thus, cells that are grown at culture conditions (37° C) on Poly(N-isopropylacrylamide) surfaces can be detached when incubation temperature is lowered below the LCST. Current technology for generating anisotropic Poly(N-isopropylacrylamide) surfaces requires cumbersome chemical modification and resource-intensive microfabrication. In contrast, electrospinning Poly(N-isopropylacrylamide) provides a straight-forward and reliable means of producing anisotropic, thermo-sensitive surfaces that allow non-enzymatic cell sheet detachment. Non-enzymatic detachment is preferable for cardiac cells, as it preserves cell structure and cell-cell adhesions that mediate cell communication. However, low protein adsorption on pure Poly(N-isopropylacrylamide) fibers impedes the formation of confluent cell layers. To overcome this potential hurdle, we blended Poly(N-isopropylacrylamide with polycaprolactone, allowing cell attachment during culture followed by detachment of aligned viable cell sheets (Allen and Zoldan, *Biomaterials Science*, 2017; Biomaterials Science Emerging Investigator Issue; US Patent App. 15/883,963). By generating aligned cell sheets, we can better recapitulate the anisotropic architecture of cardiac tissue, necessary to drive proper tissue function, taking us one step further towards engineering a cardiac syncytium. Going forward, we have established the first myocardial infarction model here at UT, and we are currently testing the ability of aligned synchronized beating cardiac sheets to improve coupling with the host myocardium.

As the aforementioned derived cardiac cells are immature, to induce their maturation, we have taken a different, yet promising, approach—modulating the redox state of differentiating cardiomyocytes. Many investigators

have focused on the negative impact of reactive oxygen species (ROS) and the imbalance between ROS and antioxidants, leading to oxidative stress and causing extensive damage to biomacromolecules such as nucleic acids and proteins. However, at low levels, ROS can also act as a powerful signaling molecule. Specifically, redox signaling, in which ROS modulates chemical pathways by electron transfer, plays a critical role in several cell signaling pathways related to cardiac differentiation and maturation. Yet, how ROS modulation affects cardiac differentiation efficiency or impacts the maturation of cardiomyocytes is still largely unclear. Filling this current gap in knowledge will help to resolve current issues related to cardiac phenotype heterogeneity and structural maturation, problems which presently hinder the clinical application of engineered tissues.

Toward this goal, we found that modulating ROS by antioxidants strongly affects the differentiation efficiency and the phenotype of resulting cardiac cells. Specifically, thiol-based antioxidants reduced the differentiation efficiency, producing less mature cells, while, non-thiol antioxidants had an opposite effect. These difference in antioxidant impact on cardiac cell differentiation and maturation were not related to their ability to scavenge cellular ROS, but to their differential modulation of mitochondrial ROS. This work demonstrated that ROS is not merely a harmful byproduct of cellular metabolism, but can also be a driving force for specifying cell lineages. Therefore, selectively targeting certain types of ROS, such as mitochondrial ROS, may substantially promote cardiac maturation (Tu and Zoldan, *Cell Research* 2018). The ability to control cardiac maturation on a cellular level offers an invaluable tool to control and understand the molecular mechanisms that drive this process. Our publication on this work has also led to an invited opinion paper detailing the involvement of ROS in nearly all aspects of cardiac maturity (Momtahan and Zoldan, *Trends in Molecular Medicine* 2019).

Based on the outlined work, **I** was selected as the 2017 Emerging Young **I**nvestigator author by *Biomaterials Science*. **I** presented our findings at numerous invited talks throughout the US, including the Distinguished Speaker Colloquium at Rice University's Department of Bioengineering, as detailed in my CV. Additionally, our growing footprint in the cardiac field has led to an invited commentary from *Cell Stem Cells*, one of the top journals in stem cell research (Tu and Zoldan, *Cell Stem Cells* 2018).

Our approach to engineer a cardiac syncytium (a cardiac tissue in which cells are electromechanically coupled and

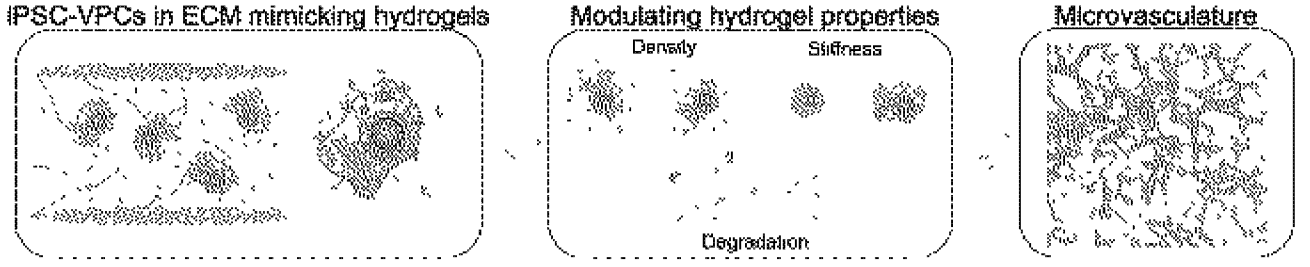

Figure 2: Developing microenvironments favorable for vascular network development.

function as a single unit) specifically addresses critical hurdles in current cardiac tissue replacement: improved maturation and electromechanical coupling. These tissues can be applied towards replacement therapies, as well as the development of patient-specific drug toxicity assays and disease modeling. As a platform system, it has broad applications, as it can be applied to other cells and tissues in which function relies on alignment, such as skeletal muscle, neuronal tissue, or tendon. Most importantly, engineering a cardiac syncytium represents a change in dogma **as it allows us to move from cells to functional engineered tissues, representing the next generation of engineered cardiac tissue.** The concept of cardiac syncytium is the basis of an NIH R01 grant proposal resubmission that is presently pending review. (ii) Developing microenvironments favorable for cardiovascular tissue formation.

A functional vascular system is essential for the formation and maintenance of most tissues in the body, and the lack of vascularization results in ischemic tissues with limited intrinsic regeneration capacity. Thus, future challenges in the field of iPSCs-derived cardiac tissue engineering are the construction of thick and vascularized tissue structures. Towards this aim, **I** focus on the development of ECM mimicking biomaterials that can encapsulate iPSC-derived vascular progenitor cells (iPSC-VPCs) and guide their assembly into mature, functional blood vessels. Specifically, we developed a novel assay that encourages the formation of 3D interconnected vascular networks derived from iPSC-VPCs in collagen hydrogels over extended culture times. Protocols to generate iPSC-VPCs have only emerged recently, and very little is understood about the behavior of these cells in 3D microenvironments. My group is the first to explore the vasculogenic potential of these cells, that is, their ability to self-assemble into vessel-like networks, in collagen hydrogels. We found that increasing the concentration of collagen in the hydrogels abrogated network formation and encouraged the formation of disconnected, large-diameter lumens. The mechanisms that drive this phenomenon were related to the cells' proteolytic capacity and the hydrogels' properties,

specifically hydrogel deformability and pore size. Our finding demonstrates that the vasculogenic potential of iPSC-VPCs is regulated by cell-matrix interactions and the matrix properties of collagen hydrogels (Crosby and Zoldan, *Tissue Engineering Part A*; Selected for a special issue on Engineered Tissues Derived From iPSCs For Disease Modeling, Drug Discovery, And Replacement Therapies). Additionally, we developed a computational pipeline that can quantify the developing vascular plexus in three dimensions, providing a numerical measure to vascular network length and connectivity. This computational pipeline is free of user bias, and the code is accessible to the scientific community, allowing each user to adjust it to fit their specific requirements (Crosby and Zoldan, *JoVE* 2019). Our work reinforces the role of ECM density and matrix metalloprotease activity on the formation of microvasculature from iPSC-VPCs. The cell-matrix interactions discussed in this study underscore the importance of understanding the role of mechano-regulation and matrix degradation on vasculogenesis and can potentially drive the development of ECM-mimicking angiogenic biomaterials. Furthermore, our work has broader implications concerning the response of iPSC-derived cells to the mechanics of engineered microenvironments. As a model system, it can be used to systematically change hydrogel properties (such as stiffness, viscoelasticity, or degradation rate) and study how these changes affect vessel network development. An understanding of these interactions will be critical to creating physiologically relevant transplantable tissue replacements and modeling the development of vascular networks in diseased and healthy tissue. This platform system of controlled tissue engineered neovascularization serves concurrently for both basic and applied studies. We are currently characterizing the impact of modulating hydrogel stiffness and degradation rate on the vasculogenic potential of iPSC-VPCs. We are also applying this system towards alleviating ischemia-related diseases such as stroke and peripheral arterial disease (two NIH R01 grant proposals that are presently pending review).

The development of the computational pipeline and its publication has spurred collaborations with many groups across the US. This work was supported by the Scientist Development Grant awarded from the American Heart Association and the Alliance of Regenerative Rehabilitation Research and Training award. We recently were invited to write a review paper on angiogenetic biomaterials (Crosby and Zoldan, *Regenerative Biomaterials* 2019). Additionally, I was invited to present this work in the 8th International Conference on Bioengineering and Nanotechnology, Society for Biological Engineering alongside the leading senior investigators in my field.

The novelty of my research program approach lies in the potential to elucidate the mechanisms that transform physical cues into biological signals and the molecular pathways by which these cues control stem cell fate commitment. Most importantly, how cell-matrix and cell-cell interactions can lead to changes in cellular organization in tissues and cell behavior. Through an understanding of the cues that drive stem cell fate, it may be possible to incorporate relevant cues into the design of future 3D microenvironments to optimize and facilitate tissue repair and regeneration. This approach will pave the way for establishing structure-function relationships between cells and tissues. Descriptive models coupling biophysical cues to achieve a phenotype are needed to drive the field of tissue engineering to the next step of engineering complex tissue structures for *in vivo* transplantation.

Since starting at UT, I have been submitting about 10-12 proposals per year. I had several grants that received a relatively high score, very close to the threshold of funding (NIH: 15 %: payline 10%; impact score of 22: payline 17; DoD: impact score 1.8: payline 1.6). I currently have a proposal pending at the National Science Foundation, and based on my conversation with the program officer, it has a high likelihood of getting funded. My research program has significantly grown in the past few years, and I am getting recognized by my community as evidenced by the awards I have received and the numerous invited talks that I have given.

Date: Sept 21, 2019

Janet Zoldan's Summary of Research

Table 1. Research Summary

Metric	Value
Number of peer-reviewed journal publications (in rank and total)	19/34
Number of peer-reviewed conference proceedings (in rank and total)	5 / 8
Number of journal papers in rank with supervised student(s) and/or post-docs from UT as co-author(s)	17
Number of journal papers in rank with supervised student(s) from UT as co-author*	17
Total citations of all publications (career) from ISI Web of Knowledge	605
Largest number of citations for a single paper based on work at UT (ISI Web of Knowledge)	18
h-index (career) from ISI Web of Knowledge	10
Total citations of all publications (career) from Google Scholar	919
Largest number of citations for a single paper based on work at UT (Google Scholar)	25
h-index (career) from Google Scholar	13
Total external research funding raised in rank	$1,030,715

Table 2. External Grants and Contracts Awarded in Rank - Current

Role of Candidate and Co-Investigators	Title	Agency	Project Total	Candidate's Share	Grant Period
PI	Ischemia therapy via temporally controlled differentiation of induced pluripotent stem cells into vascular networks	American Heart Association	$308,000	$308,000	07/2015 - 06/2019
PI	Promoting Neurovascularization Following Stroke	Alliance for Regenerative Rehabilitation Research and Training (AR3T)	$100,000	$100,000	07/2018-06/2020
PI	Painting Vasculature with Photosensitive Liposomes	NIH - NIBIB	$622,715	$537,092	09/2019-08/2022
TOTAL			$1,030,715	$945,092	

Table 3. External Grants and Contracts Awarded in Rank - Completed

Role of Candidate and Co-Investigators	Title	Agency	Project Total	Candidate's Share	Grant Period
TOTAL					

Table 4. Proposals for External Grants and Contracts Submitted in Rank - Pending

Role of Candidate and Co-Investigators	Title	Agency	Project Total	Candidate's Share	Grant Period
PI	Printing in situ cues for blood vessel formation using light patterning of photosensitive liposomes	American Heart Association	$200,000	$200,000	07/01/2019-06/30/2023
PI	Connexin Based Biomaterial For Cardiac Tissue Integration	Welch Foundation	$195,000	$195,000	06/01/2019-05/31/2022
PI	Tunable biomaterials for regulating the vasculogenic potential of iPSC-derived vascular progenitor cells	NIH	$1,884,030	$1,884,030	09/01/2019-08/31/2024
PI	Connexin-based biomaterial for coupling engineered tissue	NIH	$609,731	$609,731	09/012019-08/31/2022
PI	A microfluidic delivery approach to metabolically control cardiac differentiation and maturation	NSF	$298,412	$298,412	04/01/2019-03/31/2022
PI- Zoldan Co-I – Dunn (BME)	Temporally controlled differentiation of iPSCs into vascular networks for inducing neurovascularization in stroke models	NIH	$2,179,750	$1,069,610	09/01/2018-08/31/2023
PI-Ben Yakar (Mechanical Engineering/Biomedical Engineering) Co-I-Zoldan	Line excitation array detection (LEAD) fluorescence microscopy for ultrafast 3D flow cytometry	NIH	$1,482,838	$200,000	09/01/2019-08/31/2024
PI-Zoldan Co-PI-Ben Yakar (Mechanical Engineering/Biomedical Engineering)	A High-Throughput System for Patient Specific Cardiotoxicity Assessment of Anti-Cancer Drugs	CPRIT	$1,941,644	$1,060,360	09/01/2019-08/31/2023
TOTAL			**$8,791,045**	**$6,417,350**	

Table 5. Proposals for External Grants and Contracts Submitted in Rank – Under Review

Role of Candidate and Co-Investigators	Title	Agency	Project Total	Candidate's Share	Grant Period
PI					

Co-PI name (PI), Dept name (Co-PI), Dept					
TOTAL					

Table 6. Proposals for External Grants and Contracts Submitted in Rank - Rejected

Role of Candidate and Co-Investigators	Title	Agency	Project Total	Candidate's Share	Grant Period
PI	A Microfluidic Approach for Measuring Protein Synthesis in Live Single Cells in Multiple Myeloma	NIH	$451,687	$451,687	07/01/2014-06/30/2016
PI	Directing Induced pluripotent stem cells differentiation into the cardiovascular lineages via high throughput protein delivery	American Heart Association	$308,000	$308,000	09/01/2014-08/31/2018
PI	Protein synthesis rate a biomarker for targeting cancer metabolism	NIH	$1,372,987	$1,372,987	06/01/2015-05/31/2018
PI	The role of physical cues in stimulating induced pluripotent stem cell lineage commitment to mesoderm and cardiovascular pathway	Searle	$300,000	$300,000	07/01/2015-06/30/2018
PI	High throughput protein delivery to direct induced pluripotent and naïve state stem cells differentiation into the cardiovascular lineages.	NSF	$277,007	$277,007	09/01/2015-08/31/2018
PI-Zoldan Co-PI-Dunn (BME)	GelBrain- new therapies for treatment of ischemic stroke	UT System	$100,000	$100,000	09/01/2015-08/31/2016
PI-Zoldan Co-PI-Dunn (BME)	GelBrain- new therapies for treatment of ischemic stroke	NIH	$1,869,905	$1,764,835	04/01/2016-03/31/2021
PI-Zoldan Co-PI-Raje Noopur (Massachussets General Hospital)	Total Protein Synthesis Rate: a biomarker for targeting cancer metabolism	NIH	$1,372,990	$1,072,990	03/01/2016-02/28/2019
PI	CAREER: Modeling cardio-vasculo-genesis	NSF	$937,138	$937,138	03/01/2016-02/28/2021

	interplay for understanding heart diseases				
PI	Controlling induced pluripotent stem cell derived cardiac maturation with matrix mediated physical and biochemical cues	Welch Foundation	$195,000	$195,000	06/01/2016-05/31/2019
PI-Zoldan Co-PI-Dunn (BME)	GelBrain-new therapies for treatment of ischemic stroke (Resubmission)	NIH	$1,900,000	$1,794,930	04/01/2017-03/31/2022
PI	Elucidating the interplay between cardiogenesis and angiogenesis toward a Mechanistic Understanding of Congenital Heart Defects	NSF	$500,000	$500,000	07/01/2017-06/30/2022
PI	Deciphering the role of epicardial signaling in development of Congenital Heart Defects	NIH	$2,546,254	$2,546,254	07/01/2017-06/30/2022
PI Co-PI-Raje Noopur (Massachussets General Hospital)	Monitoring Protein Synthesis in Single Live MM cells: revealing new links between metabolism and drug resistance	NIH	$2,426,751	$1,571,750	07/01/2017-06/30/2022
PI	Inducing and visualizing vascular network stimulated neurogenesis in real time	NIH	$586,875	$586,875	06/01/2017-05/31/2019
PI	Hyaluronic acid based hydrogel library: Role of matrix hydrophobicity in myocardial cell cycle reentry	NSF	$292,007	$292,007	06/01/2017-05/31/2020
PI	Microfluidic protein delivery approach to direct cardiac cell differentiation from iPSCs	NIH	$1,886,817	$1,886,817	07/01/2017-06/30/2022
PI	Role of Reactive Oxygen Species in Cardiovascular Cell Fate Specification	NIH	$377,888	$377,888	09/01/2017-08/31/2019
PI	Connexin-based biomaterials for	NIH	$428,291	$428,291	09/01/2017-08/31/2019

	enhancing cardiac cell sheet integration				
PI-Zoldan Co-Pi-Raje Nocpur (Massachussets General Hospital)	A high throughput assay for monitoring protein synthesis rate in live cancer cells: unraveling the link between metabolism and drug resistance	NIH	$1,241,101	$938,622	12/01/2017-11/30/2020
PI-Zoldan Co-PI-Suggs (BME) Co-PI-Tiziani (DPRI, CNS)	A nano particle and microfluidic delivery approach to metabolically control cardiac cell differentiation and maturation	NIH	$620,057	$521,917	04/01/2018-03/31/2021
Co-PI-Zoldan PI-Bellan (Vanderbilt)	Microfluidic hydrogels for spatiotemporal control of stem cell differentiation in 3D	NIH (Vanderbilt Prime)	$186,883	$186,883	04/01/2018-03/31/2021
PI	CAREER: Elucidating the interplay between cardiogenesis and angiogenesis toward a Mechanistic Understanding of Congenital Heart Defects	NSF	$500,002	$500,002	07/01/2018-08/31/2023
PI-Zoldan Co-I-Baker (BME) Co-I-Stachowiak (BME)	Connexin-based biomaterials for enhancing cardiac cell sheet integration	NIH	$934,680	$874,103	06/01/2018-05/31/2023
PI	A microfluidic delivery approach to metabolically control cardiac differentiation and maturation	NSF	$296,899	$296,899	06/01/2018-05/31/2021
PI-Zoldan Co-I-Suggs (BME) Co-I Tiziani (DPRI, CNS)	A nanoparticle and microfluidic delivery approach to metabolically control cardiac differentiation and maturation	NIH	$619,636	$521,298	06/01/2018-05/31/2021
PI-Zoldan Co-I-Dunn (BME) Co-I-Suggs (BME)	Temporally Controlled Differentiation of iPSCs into Vascular Networks for Inducing Neurovascularization in Stroke Models	NIH	$2,179,750	$1,851,610	09/01/2018-08/31/2023
PI	Designing biomaterials for enhanced integration of anisotropic cell sheets (resubmission)	NIH	$428,205	$428,205	09/01/2018-08/31/2020

PI-Zoldan Co-PI-Dunn (BME) Co-I-Baker (BME)	Painting Vasculature with Photosensitive Liposomes	NIH	$622,745	$545,714	01/01/2019-12/31/2021
PI-Zoldan Co-I-Stachowiak (BME) Co-I-Baker (BME)	Connexin-Based Biomaterials for In Vivo Integration of Cardiac Cell Sheets	Department of Defense (DOD)	$1,767,655	$1,485,773	08/01/2019-07/31/2022
PI-Zoldan Co-I-Raje Noopur (Massachusetts General Hospital)	Total Protein Synthesis Rate: a Biomarker for Predicting Multiple Myeloma Staging and Drug Resistance	Department of Defense (DOD)	$569,153	$469,327	08/01/2019-07/31/2021
PI-Zoldan Co-I Stachowiak (BME) Co-I-Baker (BME)	A Biomaterial Approach to Engineering a Cardiac Syncytium for Cardiac Repair	NIH	$1,767,655	$1,485,773	05/01/2019-04/30/2024
PI	Painting Vasculature with Photosensitive Liposomes	NIH	$622,745	$622,745	04/01/2020-03/31/2023
TOTAL			$29,864,013	$26,570,586	

Table 7. Five Most Prestigious Journals and/or Conferences in Which the Candidate Published Papers in Rank

ID	Complete Name of Journal and/or Conference	Publisher
1	Biomaterials Science	Royal Society of Chemistry
2	Tissue Engineering	Mary Ann Liebert, Inc
3	Experimental Cell Research	Elsevier
4	Integrative Biology	Oxford University Press
5	Regenerative Biomaterials	Oxford University Press

Table 8. Five Journals and/or Conferences in Which the Candidate Published Most Frequently in Rank

ID	Complete Name of Journal and/or Conference	Publisher
1	Biomaterials Science	Royal Society of Chemistry
2	Tissue Engineering	Mary Ann Liebert, Inc
3	Experimental Cell Research	Elsevier
4	Integrative Biology	Oxford University Press
5	Regenerative Biomaterials	Oxford University Press

List of Five Most Significant Works – Janet Zoldan

1. 23. A. Allen, E. Barone, C.O. Crosby, L.J. Suggs, J. Zoldan*, "Electrospun poly (N-isopropyl acrylamide)/poly (caprolactone) fibers for the generation of anisotropic cell sheets", *Biomaterials Science*, 5(8), p. 1661-1669. DOI: 10.1039/c7bm00324b (July 2017). *Corresponding author.

2. 29. C.O. Crosby, D. Valliappan, D. Shu, S. Kumar, C. Tu, W. Deng, S.H. Parekh, J. Zoldan*, "Quantifying the vasculogenic potential of iPSC-derived endothelial progenitors in collagen hydrogels", Special Issue on Engineered Tissues Derived from Induced-Pluripotent Stem Cells (iPSCs) for Disease Modeling, Drug *Discovery, and Replacement Therapies, Tissue Engineering, Part A. DOI: 10.1089/ten.TEA.2018.0274*, Epub ahead of print (January 2019). *Corresponding author.

3. 27. C. Tu, A. Allen, W. Deng, O. Conroy, M. Nambiar, J. Zoldan*, "Commonly used thiol-containing antioxidants reduce cardiac differentiation and alter gene expression ratios of sarcomeric isoforms", *Experimental Cell Research*, 370(1), p. 150-159. DOI: 10.1016/j.yexcr.2018.06.017 (June 2018). *Corresponding author.

4. 32. A. Allen, E. Barone, N. Momtahan, C.O. Crosby, C. Tu, W. Deng, K. Polansky, J. Zoldan*, "Temporal impact of substrate anisotropy on differentiating cardiomyocyte alignment and functionality", Tissue Engineering, Part A. https://doi.org/10.1089/ten.TEA.2018.0258, Epub ahead of print (February 2019). *Corresponding author.

5. 17. C. Tu, L. Santo, Y. Mishima, N. Raje, Z. Smilansky, J. Zoldan*, "Monitoring protein synthesis in single live cancer cells", *Integrative Biology*, 8(5), p. 645-653. DOI: 10.1039/c5ib00279f (April 2015). *Corresponding author.

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Page 1 (Records 1 -- 10)
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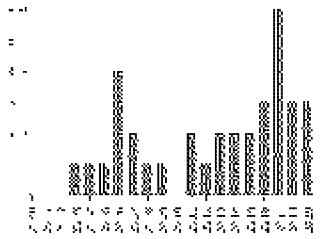

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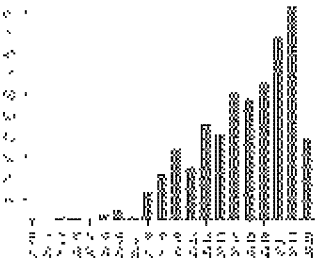

Results found:	36
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		2015	2016	2017	2018	2019	Total	Average Citations per Year
		58	66	88	103	33	605	33.61
1	Title: A vector-free microfluidic platform for intracellular delivery By: Sharei, Armon; Zoldan, Janet; Adamo, Andrea; et al Source: PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA Volume: 110 Issue: 6 Pages: 2082-2087 Published: FEB 5 2013	23	29	36	39	12	161	23.00
2	Title: The influence of scaffold elasticity on germ layer specification of human embryonic stem cells By: Zoldan, Janet; Karagiannis, Emmanouil D.; Lee, Christopher Y.; et al Source: BIOMATERIALS Volume: 32 Issue: 36 Pages: 9612-9621 Published: DEC 2011	12	7	15	13	5	88	9.78
3	Title: Effect of Scaffold Stiffness on Myoblast Differentiation By: Levy-Mishali, Merital; Zoldan, Janet; Levenberg, Shulamit Source: TISSUE ENGINEERING PART A Volume: 15 Issue: 4 Pages: 935-944 Published: APR 2009	9	12	6	4	0	77	7.00
4	Title: Endothelial potential of human embryonic stem cells By: Levenberg, Shulamit; Zoldan, Janet; Basevitch, Yaara; et al Source: BLOOD Volume: 110 Issue: 3 Pages: 806-814 Published: AUG 1 2007	2	1	1	4	3	66	5.08
5	Title: Porous polycaprolactone-polystyrene semi-interpenetrating polymer networks synthesized within high internal phase emulsions By: Lumelsky, Yulia; Zoldan, Janet; Levenberg, Shulamit; et al Source: MACROMOLECULES Volume: 41 Issue: 4 Pages: 1469-1474 Published: FEB 26 2008	2	3	5	3	1	44	3.67

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		2015	2016	2017	2018	2019	Total	Average Citations per Year
		58	66	88	103	33	605	33.61
6	Title: Directing human embryonic stem cell differentiation by non-viral delivery of siRNA in 3D culture By: Zoldan, Janet; Lytton-Jean, Abigail K. R.; Karagiannis, Emmanouil D.; et al. Source: BIOMATERIALS Volume: 32 Issue: 31 Pages: 7793-7800 Published: NOV 2011	6	4	1	4	1	31	3.44
7	Title: Metabolic control of primed human pluripotent stem cell fate and function by the miR-200c-SIRT2 axis By: Cha, Young; Han, Min-Joon; Cha, Hyuk-Jin; et al. Source: NATURE CELL BIOLOGY Volume: 19 Issue: 5 Pages: 445-+ Published: MAY 2017	0	0	6	12	5	23	7.67
8	Title: Nanoscale Strategies for Treatment of Peripheral Vascular Disease and Critical Limb Ischemia By: Tu, Chengyi; Das, Subhamoy; Baker, Aaron B.; et al. Source: ACS NANO Volume: 9 Issue: 4 Pages: 3436-3452 Published: APR 2015	1	5	8	2	2	18	3.60
9	Title: Interface modification and characterization in three-component polymer blends By: Fisher, R.; Zoldan, J.; Siegmann, A.; et al. Source: POLYMER COMPOSITES Volume: 21 Issue: 3 Pages: 476-491 Published: JUN 2000	1	0	1	0	0	14	0.70
10	Title: Regenerated cellulose micro-nano fiber matrices for transdermal drug release By: Liu, Yue; Nguyen, Andrew; Allen, Alicia; et al. Source: MATERIALS SCIENCE & ENGINEERING C-MATERIALS FOR BIOLOGICAL APPLICATIONS Volume: 74 Pages: 485-492 Published: MAY 1 2017	0	0	3	4	3	10	3.33

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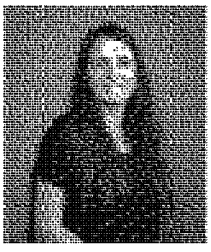

Janet Zoldan

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TITLE	CITED BY	YEA
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Synthetic microparticles conjugated with VEGF 165 improve the survival of endothelial progenitor cells via microRNA-17 inhibition S Aday, J Zoldan, M Besnier, L Carreto, J Saif, R Fernandes, T Santos, ... Nature communications 8 (1), 747, 2017	10	201
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Department of Biomedical Engineering Budget Council Statement on Academic Advising, Counseling, and Other Students Services

Candidate: **Dr. Janet Zoldan, Ph.D. Assistant Professor**

Prepared by: **Dr. Pengyu Ren, Ph.D.**

Dr. Pengyu Ren was appointed by Dr. Shelly Sakiyama-Elbert, Chair of the Department of Biomedical Engineering, to evaluate the advising of Professor Janet Zoldan. The Budget Council considered all aspects of Dr. Zoldan's academic advising, counseling, and student services.

Introduction – While in rank, Professor Zoldan has established herself as a leader in both undergraduate and graduate student mentorship. Dr. Zoldan is passionate about undergraduate education and has positively impacted a number of undergraduate students in both academic and career development. Professor Zoldan's graduate students have been very productive in research and publications under her supervision.

Since arriving at UT, Professor Zoldan has devoted significant amount of time and effort to advise 25 undergraduate students in her lab, including 4 Engineering Honors Theses. Professor Zoldan met with these students weekly to discuss their research progresses and academic career development. Professor Zoldan's determination has led to successful results. Out of the 25 undergraduate students, 8 were co-authors in peer-reviewed journal articles published by the Zoldan lab, and 11 received UT's Undergraduate Research Fellowship. Several received research poster awards, presented at national research conferences, and were admitted to prestigious graduate and medical degree programs. Professor Jordan also served as an advisor to 4 undergraduate senior design teams.

Professor Zoldan has served as the sole advisor to 5 Biomedical Engineering graduate students since starting her lab at UT. Two students have successfully completed their PhD programs in BME, two completed their MS degrees, and one remains in PhD candidacy since 2017. Two of Professor Zoldan's students were awarded the National Science Foundation Graduate Fellowship and one received the National Institutes of Health T32 graduate training fellowship. Most also received various fellowships from UT Austin due to their excellent academic performance. Professor Zoldan put strong emphasis on helping her students to improve communication skills and to broaden their knowledge in various scientific fields. The graduate students in Zoldan lab are productive in research and prolific publications. One PhD student published 5 firs-authored journal articles, plus a few as a middle author. The PhD student still in progress has already published 3 first-authored papers. Professor Zoldan has served on 22 dissertation committees (including her own students) with 12 completed and 10 in progress. In addition, Professor Zoldan has worked with 2 postdoctoral researchers.

In summary, Dr. Zoldan is recognized as an excellent advisor to both undergraduate and graduate students on our faculty. The quality and productivity the students have demonstrated under her supervision reflect Professor Zoldan's dedication and success in student advising and counseling. The Budget Council concludes that Dr. Zoldan exceeds the expectations for academic advising, counseling, and other student services to be promoted to Associate Professor.

Mentoring and Advising Statement

Overview

As a professor, I have a great opportunity to shape the education of future biomedical engineers by sharing my knowledge and experience with both graduate and undergraduate students. I have always believed that most students can flourish under the right learning environment, and it is my job as a teacher and a mentor to provide such an environment.

Since starting my laboratory at UT Austin, I have already worked with two postdoctoral researchers, five graduate students, 25 undergraduates, and a high school student in the laboratory. I consider guiding students through the excitement of new discoveries and the difficulties of failed experiments, and watching them become mature and professional scientists, to be the most significant privilege a professor can have. I strive to provide my students with a stimulating and collegial environment for them to work at the cutting edge of research. I take a very personal interest in mentoring my students through weekly one-hour meetings. I have an "open-door policy", and often students meet with me 3-5 times over the week, particularly during experimental segments involving new procedures where more guidance is required. Additionally, there is a scheduled bi-monthly group meeting in which both graduate and undergraduate students present their findings to their peers in the laboratory; this is a valuable exercise to develop scientific discussions, as well as critical scientific presentation skills in preparation for presenting experimental findings at academic conferences.

Undergraduate Student Advising

I have served as an advisor to 25 undergraduates in my laboratory. Upon joining my group, students are first tasked to read a review article on the state of stem cell-based tissue engineering. We then meet and discuss what they learned. Next, I match them with a graduate student or a postdoctoral researcher who becomes their direct supervisor. I make sure to meet with undergraduate students once a week for an individual meeting, and they actively participate in our group meetings. Undergraduate students have contributed substantially to all aspects of my research program from performing routine tasks like preparing materials and maintaining cell lines to executing complex projects such as designing electrical stimulation devices, engineering novel biomaterials, and developing algorithms for image and video processing. Many of these students have distinguished themselves as researchers with eight serving as co-authors of peer-reviewed journal articles. Additionally, participation in research has led to a variety of recognitions for these students including research poster awards, receipt of the UT Austin's Undergraduate Research Fellowship, presentation at national conferences, admission to prestigious graduate and medical degree programs. In our weekly meetings, I have also provided career and academic advising to these students. Additionally, I have advised several senior design teams in the BME department and have advised four Engineering Honors Undergraduate Thesis projects. These activities are detailed below with the accomplishments of individual students highlighted.

1. **Alexandra (Dugger) Keierleber,** Biomedical Engineering (Fall 2013-Summer 2014)
   - Currently, a Cell Therapy Sales Specialist at GE Healthcare
2. **Smridhi Mahajan,** Biomedical Engineering (Fall 2013-Spring 2014)
   - Currently, a medical student at UT health Houston
3. **Priyanka Deshpande,** Biomedical Engineering (Spring 2014-Spring 2016)
   - Currently, a medical student at Baylor School of Medicine
   - Recipient of UT Austin's Undergraduate Research Fellowship (Fall 2014-Summer 2015)
   - Won 2nd Place in the Cockrell School of Engineering Undergraduate Research Poster Competition (Spring 2015)
   - Presented a poster at the annual meeting of the Biomedical Engineering Society, Tampa, FL (Fall 2015)
   - Completed Undergraduate Engineering Honors Thesis (Spring 2016)
4. ***Robert Xu,** Biomedical Engineering (Summer 2014-Spring 2017)
   - Currently, a Business Technology Analyst at Deloitte
   - Recipient of UT Austin's Undergraduate Research Fellowship (Fall 2014-Summer 2015)
   - Co-author of a peer-reviewed journal article (2017)
5. ***Madhavi Nambiar,** Biomedical Engineering (Summer 2014-Fall 2016)
   - Currently, a Senior Consultant at Quorum Software
   - Recipient of UT Austin's Undergraduate Research Fellowship (Fall 2015-Summer 2016)
   - Co-author of a peer-reviewed journal article (2018)
   - Completed Undergraduate Engineering Honors Thesis (Spring 2016)

6. **Karl Solomon,** Biomedical Engineering (Fall 2014-Fall 2015)
   - Currently, a Design Engineer at Stryker
   - Recipient of the best undergraduate student poster award in the Annual University of Texas at Austin Nano Night poster session (Fall 2014)
7. **Jorge Gomez Medellin,** Chemical Engineering (Summer 2015-Fall 2016)
   - Currently, a graduate student at Chicago University
   - Recipient of UT Austin's Undergraduate Research Fellowship (Spring 2016-Summer 2016)
8. **Anika Tanwani,** Biomedical Engineering (Summer 2015-Fall 2016)
   - Currently, a medical student at the University of Texas Medical Branch at Galveston.
   - Recipient of UT Austin's Undergraduate Research Fellowship (Fall 2015-Summer 2016)
9. ***Meghana Koleti,** Biomedical Engineering (Summer 2015-Spring 2018)
   - Currently, a medical student at UT Medical School at San Antonio
   - Recipient of UT Austin's Undergraduate Research Fellowship (Fall 2015-Summer 2016)
   - Co-author of a peer-reviewed journal article (2017)
10. **Stefani Maris,** NSF undergraduate research fellow (Summer 2015)
    - Currently, a Field Engineer at Schlumberger Technology
    - Presented a poster at the annual meeting of the Biomedical Engineering Society, Tampa, FL (Fall 2015)
11. **Madelyn Szilagyi-Jones,** Visiting student (Summer 2015)
    - Currently, a Research Technician at Baylor School of Medicine.
12. ***Elissa Barone,** Biomedical Engineering (Fall 2015-Spring 2018)
    - Currently, a System Engineer at Illumina Inc.
    - Recipient of UT Austin's Undergraduate Research Fellowship (Spring 2017-Summer 2017)
    - Co-author of two peer-reviewed journal articles (2017 and 2019)
13. **Christine Wei,** Biomedical Engineering (Spring 2016- Spring 2017)
    - Currently, a Quality Engineer at LivaNova
14. ***David Shu,** Chemical Engineering (Summer 2016-Spring 2019)
    - Continuing undergraduate.
    - Recipient of UT Austin's Undergraduate Research Fellowship (Fall 2016-Summer 2017)
    - Co-author of a peer-reviewed journal article (2019)
15. **Alston-Laura Feggins,** NSF undergraduate research fellow (Summer 2016)
    - Currently a junior Digital Analyst at Booz Allen Hamilton.
    - Presented a poster at the annual meeting of the Biomedical Engineering Society, Minneapolis, MN (Fall 2016)
16. **Adam Jerome Poole,** Visiting student (Fall 2016)
    - Continuing undergraduate at Stanford University
17. ***Krista Polansky,** Biomedical Engineering (Fall 2016-Summer 2018)
    - Continuing undergraduate
    - Recipient of UT Austin's Undergraduate Research Fellowship (Fall 2016-Summer 2017)
    - Co-author of a peer-reviewed journal article (2019)
18. **Yilun Wang,** Electrical Engineering (Fall 2016)
    - Continuing undergraduate
19. **Daegi Lee,** Biomedical Engineering Spring 2017-Summer 2017)
    - Currently a Solution Engineer at Oracle
20. ***Olivia Conroy,** Biomedical Engineering (Spring 2017-Spring 2019)
    - Continuing undergraduate
    - Recipient of UT Austin's Undergraduate Research Fellowship (Fall 2017-Summer 2018)
    - Enrolled in the MS/BME program, University of Texas at Austin (2018)
    - Co-author of a peer-reviewed journal article (2019)
21. ***Deepti Valliappan,** Biomedical Engineering (Summer 2017- present)
    - Continuing undergraduate
    - Recipient of UT Austin's Undergraduate Research Fellowship (Fall 2017-Summer 2018)
    - Finalist for the BME Undergraduate Poster Competition (2018)
    - Enrolled in the MS/BME program, University of Texas at Austin (2018)
    - Co-author of a peer-reviewed journal article (2019)

22. **Shahar Pedazhur,** Biomedical Engineering (Spring 2018- present)
    - Continuing undergraduate
23. **Remy Fenrich,** Biomedical Engineering (Spring 2018- present)
    - Continuing undergraduate
24. **Analaura Rodriguez,** Biomedical Engineering (Spring 2018- present)
    - Continuing undergraduate
25. **Shreya Ramesh,** Biomedical Engineering (Spring 2018- present)
    - Continuing undergraduate

Undergraduate Honor Thesis

- Ms. Priyanka Deshpande, Spring 2016, Construction of a bioartificial kidney using decellularized organ ECM and naive pluripotent stem cells".
- Ms. Madhavi Nambiar, Spring 2016, The effects of oxidative stress via high glucose on mouse embryonic derived embryoid body formation".
- Ms. Divya Ramamoorthy, Spring 2016, The effect of mechanotransduction on cardiomyocyte viability and differentiation" (2nd reader).
- Ms. Pauline Margaret Berens, Spring 2017, Exploding liposomes: delivering growth factors to improve healing" (2nd reader).
- Mr. Ethan Kwan, Spring 2018, Characterization of a decellularized scaffold for the study of human mitral valve interstitial cells" (2nd reader).

Senior Design Project Teams (BME 371)

- Spring 2019: A magnetic suturing device for wrist arthroscopy.
- Spring 2019: A paper-based diagnostic of immunoglobulins.
- Spring 2017: Access hole closure after endoscopic transsphenoidal surgery.
- Spring 2015: Tissue scull anchor design.

Graduate Student Advising

Since starting my laboratory at UT Austin, I have supervised five graduate students. Alysa Joaquin and Julie Strickland have completed their M.S degrees; Alicia Allen and Chengyi Tu have recently completed their Ph.D. degrees; Cody Crosby has advanced to candidacy. I am proud to say that my graduate students are passionate and outstanding researchers. Working with them is my greatest professional passion, and I have learned from them as much as they learned from me, if not more.

Upon joining my laboratory, I first teach my students basic laboratory techniques in molecular cell biology, embryonic stem cell culture, engineering biomaterials, and developing drug delivery systems. We next work on developing their research skills; formulating a hypothesis and experimental design (controls, repeats, statistics), followed by results analysis. I strive to develop in them a flexible way of thinking and encourage them to troubleshoot when experiments do not work or do not follow the expected route, and generally think outside of the box". Once their scientific skills have developed, I encourage them to come up with new ideas or directions and guide them to follow through. During the summer, we do not have group meetings; instead, we have initiated a journal club. All members of my laboratory meet once a week to take turns in presenting their choice for a recent breakthrough in stem cell tissue engineering. I believe that these meetings prompt scientific discussions, keep everyone up to date with current, on-going science around the world, and broaden their scientific background. To explore what other groups outside of our department are doing, last summer, I hosted PIs from the Institute for Cellular and Molecular Biology and the Dell Pediatric Research Institute along with their group members. The PIs gave a short overview of their research focus, and then we engaged in Post-it note poster presentations where each student presented their research on a Post-it note. These presentations force the student to develop their verbal communication skills and describe their research in lay terms. This summer we will be hosting PIs from Chemical and Mechanical Engineering.

I encourage the scholarly development of my students. To develop scientific writing skills and broaden their knowledge in the field of stem cell tissue engineering, I make sure that they participate in writing review papers. I provide funds and expect them to travel once a year to an appropriate scientific conference to present their experimental data. I also encourage the students to publish these findings in peer-reviewed journals. We set yearly academic and professional goals and ways to accomplish them. While these goals often change, these discussions help students to plan ahead and evaluate career choices.

To aid in the research progress and provide a useful mentorship experience for graduate students' and postdoctoral fellows' future careers, I encourage my students to train undergraduate researchers. In addition to gaining extra hands for experimental preparation, this allows them to learn valuable mentorship skills, as well as hone their knowledge by answering a wide array of questions. As an indication of their valuable work, almost all

trainees have received the UT Austin's Undergraduate Research Fellowships.

My students have distinguished themselves by working together and contributing to each other's manuscripts, giving outstanding oral presentations at national conferences and by winning individual fellowship support from local and federal sources (NSF, NIH). Additionally, Alicia Allen has served as co-inventor on a recent patent application. My doctoral students and their key accomplishments are highlighted below.

Completed Ph.D. Students:

1. **Alicia Allen**, Biomedical Engineering, UT Austin, May 2018
2. **Chengyi Tu**, Biomedical Engineering, UT Austin, August 2018

Completed M.S. Students:

1. **Alysa Joaquin**, Biomedical Engineering, UT Austin, August 2016
2. **Julie Strickland**, Biomedical Engineering, UT Austin, December 2017

Ph.D. Students in Progress:

1. **Cody O. Crosby**, Biomedical Engineering, UT Austin, (Candidate since February 2017)

Graduate Student Awards and Honors:

- Alysa Joaquin: Recipient of the National Science Foundation Graduate Research Fellowship Program (Summer 2013-Summer 2016)
- Alysa Joaquin: Recipient of the National Science Foundation Prestigious Bruton Award (Fall 2013)
- Alysa Joaquin: Recipient of the University of Texas at Austin, Cockrell School of Engineering, Engineering Doctoral Fellowship (Fall 2013-Spring 2016)
- Alysa Joaquin: Recipient of the University of Texas at Austin Graduate School Professional Development Award (Fall 2014)
- Alysa Joaquin: Recipient of the University of Texas at Austin, Dean's Prestigious Fellowship (Fall 2014, Fall 2015)
- Alysa Joaquin: Recipient of the National Science Foundation Supplement (Spring 2015)
- Alicia Allen: Recipient of the University of Texas at Austin Graduate School, Dean's Prestigious Fellowship (Fall 2015, Fall 2016, Fall 2017)
- Alicia Allen: Recipient of the University of Texas at Austin, Cockrell School of Engineering, Virginia & Ernest Cockrell, Jr. Fellowship in Engineering (Fall 2013-Spring 2017)
- Alicia Allen: Recipient of the Travel Award to attend the Weinstein Cardiovascular Development and Regeneration Conference, Durham, NC (2016)
- Alicia Allen: Recipient of the University of Texas at Austin Graduate School, Professional Development Award (Fall 2017)
- Alicia Allen: Recipient of the National Science Foundation Graduate Research Fellowship Program (Summer 2015-Spring 2018)
- Alicia Allen: Won 2nd place in the poster presentation competition at the Texas Biomaterials Day, Austin, TX (2017)
- Alicia Allen: Recipient of the University of Texas at Austin, Cockrell School of Engineering, Runge Endowed Presidential Fellowship in Biomedical Engineering (Fall 2017-Spring 2018)
- Chengyi Tu: Recipient of the University of Texas at Austin Graduate School Recruitment Fellowship (Fall 2013-Spring 2017)
- Chengyi Tu: Recipient of the University of Texas at Austin Graduate School, Professional Development Grant (Spring 2018)
- Chengyi Tu: Recipient of the University of Texas at Austin Graduate School, Continuing Graduate Fellowship (Summer 2018)
- Chengyi Tu: Recipient of the University of Texas at Austin, Cockrell School of Engineering, Cullen Crain Endowed Scholarship in Engineering (Fall 2017-Spring 2018)
- Julie Strickland: Recipient of the National Institutes of Health T32 Graduate Training Fellowship (Fall 2015-Summer 2016)
- Julie Strickland: Recipient of the University of Texas at Austin Graduate School, Engineering Foundation Scholarship (Fall 2015-Spring 2016)
- Julie Strickland: Recipient of the University of Texas at Austin, Cockrell School of Engineering, Earnest & Elsie Clawson Scholarship (Fall 2016-Spring 2017)
- Cody Crosby: Recipient of the National Institutes of Health T32 Graduate Training Fellowship (Fall 2015-Summer 2016)

- Cody Crosby: Recipient of the University of Texas at Austin, Cockrell School of Engineering, Thrust 2000 Fellowship (Fall 2015-Spring 2019)
- Cody Crosby: Recipient of the University of Texas at Austin, Graduate School, Provost Graduate Excellence Fellowship (Fall 2015-Summer 2018)
- Cody Crosby: Received Honorable Mention in the National Science Foundation Graduate Research Fellowship Program Competition (Fall 2017)
- Cody Crosby: Recipient of the University of Texas at Austin Graduate School, Professional Development Award (Spring 2018)
- Cody Crosby: Selected for oral presentation at the 1st UT BME Student Retreat, Austin, TX (2018)
- Cody Crosby: Selected as one of two students for oral presentation at the 2nd Rock Stars of Regenerative Engineering, San Francisco, CA (2019)
- Cody Crosby: Selected for oral presentation in the Rapid-Fire Session at the Texas Biomaterials Day, Houston, TX (June 2019)

Dissertation Committees

Dissertation Completed:

- Dr. Laura Geuss, Biomedical Engineering, defended 2014
- Dr. Laura Ricles, Biomedical Engineering, defended 2014
- Dr. Jonathan Peters, Chemical Engineering, defended 2015
- Dr. Avinash Kaur Gadok, Biomedical Engineering, defended 2017
- Dr. Lindsey Sharpe, Biomedical Engineering, defended 2017
- Dr. Salma Ayoub, Biomedical Engineering, defended 2018
- Dr. Zachary Imam, Biomedical Engineering, defended 2018
- Dr. Alicia Allen, Biomedical Engineering, defended 2018
- Dr. Chengyi Tu, Biomedical Engineering, defended 2018
- Dr. Hunter Joyce, Biomedical Engineering, defended 2018
- Dr. Kiheon Baek, Biomedical Engineering, defended 2019
- Dr. Kabir Dhada, Biomedical Engineering, defended 2019

Dissertation in Progress:

- Ms. Amanda K Vaughn, Nutrition
- Ms. Aimee Chi Zhao, Biomedical Engineering
- Mr. Nicholas White, Biomedical Engineering
- Mr. Alexander Noblett, Biomedical Engineering
- Ms. Jaewon Lee, Biomedical Engineering
- Ms. Kayla Henderson, Biomedical Engineering
- Mr. Cody Crosby, Biomedical Engineering
- Ms. Aaliyah Shodeinde, Chemical Engineering
- Ms. Taneidra Walker, Biomedical Engineering
- Mr. Prachi Dhavalikar, Biomedical Engineering

Doctoral Qualifying Exams:

- Mr. Hunter Joyce, Biomedical Engineering, passed 2014
- Mr. Chris Martin, Biomedical Engineering, passed 2014 (chair)
- Mr. Kabir Dhada, Biomedical Engineering, passed 2015 (chair)
- Mr. Kihoen Baek, Biomedical engineering, passed 2015
- Ms. Aimee Chi Zhao, Biomedical engineering, passed 2015
- Mr. Ryan Woodel, Biomedical Engineering, passed 2015
- Ms. Chelsea Kraynak, Biomedical Engineering, passed 2016 (chair)
- Ms. Ming-Ming Tran, Biomedical Engineering, failed 2016 (chair)
- Ms. Marissa Wechsler, Biomedical Engineering, passed 2016 (chair)
- Ms. Jaewon Lee, Biomedical engineering, passed 2016 (chair)
- Mr. Andre DeGroot, Biomedical Engineering, passed 2016 (chair)
- Mr. Alex Khan, Biomedical Engineering, passed 2017
- Mr. Hao Liu, Biomedical Engineering, passed 2018
- Mr. Daniel Chavarria, Biomedical Engineering, passed 2018 (chair)
- Mr. Justin Houser, Biomedical Engineering, passed 2018

- Ms. Jessica Widman Biomedical Engineering, passed 2018
- Ms. Sangamithra Vardhan, Biomedical Engineering, passed 2018
- Mr. Wenbai Huang, Kinesiology, passed 2019
- Mr. Paul Gnes, Nutrition, passed 2019
- Ms. Dana Jenkins, Biomedical Engineering 2019
- Mr. ByunGee Im, Biomedical Engineering 2019
- Mr. Miles Massida, Biomedical Engineering 2019
- Ms. Elizabeth Bender, Biomedical Engineering 2019
- Ms. Brianna Morales, Biomedical Engineering 2019
- Ms. Sadhana Gollapudi, Biomedical Engineering 2019

Janet Zoldan's Summary of Advising, Counseling, and Other Student Services

Table 1. Summary of Academic Advising

Metric	Value
Student organizations advised	0
Undergraduate researchers supervised	25
PhD students completed (sole supervisions and co-supervisions)*	2 / 0
MS students completed (sole supervisions and co-supervisions)*	2 / 0
PhD students in pipeline (sole supervisions and co-supervisions as of 8/31/2019)*	1 / 0
MS students in pipeline (sole supervisions and co-supervisions as of 8/31/2019)*	0

Table 2. Degrees Conferred to Graduate Students Supervised

Student Name	Co-Supervisor*	Degree	Start Date	Graduation Date	Placement
Chengyi Tu	N/A	PhD	01/2014	08/2018	Postdoctoral fellow at Stanford
Alicia Allen	N/A	PhD	09/2013	05/2018	Senior scientist at United Therapeutics
Julie Strickland	N/A	MS	09/2015	12/2017	Project Specialist at Syneos Health
Alysa Joaquin	N/A	MS	09/2013	08/2016	Project Manager at BlueShift Materials Inc

COCKRELL SCHOOL OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

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Department of Biomedical Engineering Budget Council Statement on Service to the University, Nation, State, and Community

Candidate **Dr. Janeta Zoldan, Ph.D. Assistant Professor**

Prepared by **Dr. H. Grady Rylander, III, MSEE, MD**

Dr H Grady Rylander, III was appointed by Dr Shelly Sakiyama-Elbert, Chair of the Department of Biomedical Engineering, to evaluate the service of Professor Janet Zoldan The Budget Council considered all aspects of Dr Zoldan's service to her department, college, university, and community with a particular emphasis on the last three years of service

While in rank, Dr Zoldan has established herself as a leader in national/international professional societies and the research community She has held an elected position in the Society for Biomaterials (SFB) Her service on grant review panels has been multidisciplinary, spanning both national and international agencies Her journal peer review service has spanned from field-specific journals such as *Biomaterials, Tissue Engineering, Cell Stem Cells* to journals that cover broad areas of science such as *Nature Communications* and *Science Advances* She has also been an active member of several departmental committees and has been an evaluator for the undergraduate research program Her service both professionally and to the BME Department has impacted her students and her peers

At the department level, Dr Zoldan has served on five committees Her work on the undergraduate curriculum committee led to improvements in the math/computing curriculum and the establishment of an instrumentation class with lab Additionally, the undergraduate curriculum committee established a new bachelor's/master's integrated degree, MS/BME, during her tenure on that committee Her work on the admissions committee for domestic and international students has produced five years of highly qualified new graduate students for the BME faculty While serving on the seminar committee, Dr Zoldan facilitated the establishment of a seminar series that brought physicians from DMS to BME to discuss problems at the interface between medicine and engineering That seminar series motivated several faculty collaborations and has continued to provide projects for the undergraduate capstone class

At the college level, Dr Zoldan participated in panel discussion for Graduates Linked with Undergraduates in Engineering (GLUE) and Early Career Awards She reviewed applications for the National Institutes of Health, National Cancer Institute Predoctoral to Postdoctoral Fellow Transition Award (F99/K00), Internal Competition in 2018

At the university level, Dr Zoldan has biannually evaluated undergraduate student applications for Undergraduate Research Fellowships She assessed the research and scholastic achievements of faculty applying for the Rita Allen Foundation Scholars Program Additionally, she was a

member of the Advisory Committee for the mouse genetic engineering facility, where she worked to increase the impact of this facility within the university's bioscience community

Dr Zoldan's service to her research community and professional societies has been exemplary She has been a peer reviewer for 21 journals She has served on eight grant review panels including NIH, NASA, NSF and AHA She is currently Secretary-Treasurer for the Engineering Cells and Their Microenvironments, SFB Special Interest Group Dr Zoldan is member of the Scientific Advisory Board for the next world TERMIS (Tissue Engineering and Regenerative Medicine International Society) congress in Maastricht, Nederland, 2021 She chaired four sessions of BMES and was tract chair for the Tissue Engineering Track

Dr Zoldan has been a mentor for several student organizations including the Society of Women Engineers (SWE), Graduates Linked with Undergraduates in Engineering (GLUE), the Women in Biomedical Engineering (WBME), and the Woman in Engineering Program (WEP) She organized presentations for Explore UT and was a judge for several posted presentations She has also judged local and regional science fairs

In summary, Dr Zoldan is recognized as a team player in the BME Department The Budget Council concludes that Dr Zoldan exceeds the expectations for service at all levels to be promoted to Associate Professor

Service Statement

Departmental Committee Service

I have been heavily involved in the service associated with the day-to-day operations of our department. In particular, I have been a member of several departmental committees including the admissions committee for both domestic and international students, faculty and BME building manager search committees, the safety committee, the undergraduate curriculum committee, and the seminar committee. Additionally, I have served on 25 qualification exams and 22 dissertation committees, 10 of which are currently in progress. Out of all of the departmental service that I have performed, I would like to highlight two specific activities: a new seminar series that I started, and my work on the undergraduate curriculum committee.

(i) The Doctor is in the house" seminar series

I have established a new seminar series in the department called The doctor is in the house". These seminars bring a clinical perspective to Biomedical Engineers. Each seminar is led by a physician to introduce the basic clinical features of a specific medical field, present the current challenges, and have an open discussion on how biomedical engineers can impact this field. Early communication with physicians is important to identify the right problem and potentially establish interdisciplinary teams that can significantly advance healthcare solutions and improve patients' quality of life. The Doctor is in the house" seminar series generated significant excitement among our faculty and students. Highlights include the seminars given by Dr. Robert Buchanan (Chief of Neurosurgery, Brain and Spine Institute, Seton) and by Dr. Steven Abrams (Director of the Dell Pediatric Research Institute). Dr. Abrams' seminar was followed by a mixer with physicians from Seton, providing a valuable networking opportunity for our department. Undergraduate students who were planning to attend medical school were extremely excited to have these seminar series and interactions with physicians. Many of them thanked me for establishing this seminar series. Overall these seminars have helped forge strong ties with the Dell Medical School (DMS), leading to the formation of new collaborations between our faculty and DMS physicians. Also, many DMS physicians are now participating in the department's senior design projects. This past year half of the projects our students worked on as their senior design projects were initiated by DMS physicians.

(ii) The undergraduate curriculum committee

Together with my fellow members of the undergraduate curriculum committee, we have revamped our undergraduate curriculum in engineering computing. Specifically, we have recommended changing the content of several courses to allow our undergraduate students to acquire more competitive programming skills in Raspberry Pi, Python, and MATLAB languages. Additionally, we have established a new bachelor's/master's integrated degree, MS/BME. In this program, select students have the opportunity to earn a bachelor's degree in Biomedical Engineering simultaneously with a master's degree, all within five years. I was excited when the first student cohort started this fall, and two of them were undergraduate students who are working in my laboratory. I believe that having strong programming skills and an opportunity to earn an advanced degree in a relatively short time will significantly increase the competitiveness of our undergraduate students in the job market.

Summary of service activities at the department level:

- Undergraduate Student Advising, BME, 2013-Present
- Member, Graduate Admissions Committee, 2014-2016
- Member, International Graduate Admissions Committee, 2013-2015
- Founder, seminar series The Doctor is in the House", 2013-Present
- Member, the search committee for Identifying Young Full Professor, 2014-2015
- Member, the search committee for a new BME building manager, 2015
- Member, Safety Committee, 2015-2016
- Member, Seminar Series Committee, 2016-Present
- Member, Undergraduate Curriculum Committee, 2016-Present

Cockrell School of Engineering Service

At the College level, I have participated in multiple outreach events and served on panels for faculty and undergraduate students. In addition, I evaluated the research and scholastic achievements of graduate students, nominated for the National Institutes of Health, National Cancer Institute Predoctoral to Postdoctoral Fellow Transition Award (F99/K00).

Summary of service activities at the college level:

- Reviewed applications for the National Institutes of Health, National Cancer Institute Predoctoral to Postdoctoral Fellow Transition Award (F99/K00), Internal Competition, 2018

- Participated in Research Careers in Industry and Academia Panel Discussion in Graduates Linked with Undergraduates in Engineering (GLUE) Undergraduate Research, 2018
- Participated in Early Career Awards Panel Discussion, 2018

University Service

At the university level, since starting my position at UT, I have been evaluating biannually undergraduate student applications for the Undergraduate Research Fellowships. I assessed the research and scholastic achievements of faculty applying for the Rita Allen Foundation Scholars Program. Additionally, I was a member of the Advisory Committee for the Mouse Genetic Engineering Facility, where I worked to increase the impact of this facility within the university's bioscience community.

Summary of service activities at the university level:

- Reviewed applications for Undergraduate Research Fellowships biannually, 2013-present
- Reviewed applications for the Rita Allen Foundation Scholars Program, Internal Competition, 2017
- Served on the Advisory Committee for the Mouse Genetic Engineering Facility, 2019

Service to Student Organizations

I have participated in several University-related activities associated with student groups. Specifically, I have served as a judge for undergraduate and graduate research posters at our departmental research symposia. I have also participated in social events and panel discussions that focused on career mentoring. These activities have been held in conjunction with the Society of Women Engineers (SWE), Graduates Linked with Undergraduates in Engineering (GLUE), the Women in Biomedical Engineering (WBME), and the Woman in Engineering Program (WEP).

Summary of student-related service activities:

- Undergraduate student advising, each semester since 2013
- Judged at the Biomedical Engineering Society (BMES) UT Austin chapter case competition, 11/2014
- Participated in a faculty panel discussion on envisioning obstacles as opportunities for the Society of Women Engineers (SWE), 03/2015
- Participated in a faculty panel discussion on finding a work/life balance for SWE, 09/2016
- Participated in the Women in Biomedical Engineering (WBME) luncheon, 04/2015; 04/2016; 04/2017; 04/2019
- Judged at the BME Undergraduate Research Poster Competition, 05/2015; 05/2016; 05/2019
- Participated in the Woman in Engineering Program (WEP) faculty/student social, 10/2015; 10/2017; 10/2018
- Participated in the WBME breakfast with faculty, 11/2015
- Explore UT; organized lab-based activities to showcase our research to the general community, 03/2016; 03/2017
- Judged student posters in the 1st UT BME Student Retreat, 08/2018
- Participated in a panel discussion on research careers in industry and academia in Graduates Linked with Undergraduates in Engineering (GLUE), Undergraduate Research Course, 11/2018

Service to the Nation, State, and Community

I have been involved in service at the national and international levels through conference organization, peer review of scientific articles for journals, and peer review for multiple federal funding agencies and foundations. In particular, I have been an active member of the Biomedical Engineering Society (BMES), for which I have chaired scientific sessions and tracks at multiple national meetings. Additionally, I have taken on leading positions in organizational committees of the Society for Biomaterials (SFB), where I have been a member of the Finance Committee for the past year. Furthermore, I was recently elected as Secretary-Treasurer in the Engineering Cells and Their Microenvironments, Special Interest Group of SFB. My journal peer review service has spanned from field-specific journals such as *Biomaterials*, *Tissue Engineering*, *Cell Stem Cells* to journals that cover broad areas of science such as *Nature Communications* and *Science Advances*. My service on grant review panels has been multidisciplinary, spanning both national and international agencies. I reviewed grant proposals for the Genome British Columbia's Strategic Opportunities Fund and the Israeli Ministry of Science, Technology, and Space. Nationally, I served on grant review panels for the National Institutes of Health, National Science Foundation, National Aeronautics and Space Administration, and the American Heart Association. Review panels ranged from rehabilitation engineering to space biology.

Professional Society/Conference Organization

- Biomedical Engineering Society (BMES) – Reviewed abstracts and chaired two sessions at the annual meeting in San Antonio, TX, 2014
- BMES – Reviewed abstracts for the annual meeting in Tampa, FL, 2015

- BMES – Reviewed abstracts and chaired one session at the annual meeting in Minneapolis, MN, 2016
- BMES – Reviewed abstracts and chaired one session at the annual meeting in Phoenix, AZ, 2017
- BMES – Track Chair, Tissue Engineering Track at the annual meeting in Atlanta, GE, 2018
- Society of Biomaterials (SFB) – Finance Committee member, 2018
- SFB – Reviewed abstracts, chaired one session and judged poster session at the annual meeting in Seattle, WA, 2019
- SFB – Secretary-Treasurer in the Engineering Cells and Their Microenvironments, Special Interest Group, 2019
- 8th International Conference on Bioengineering and Nanotechnology – Chaired one session, Baltimore, MD, 2019
- Tissue Engineering and Regenerative Medicine International Society (TERMIS) – Member of the Scientific Advisory Board for the next world TERMIS congress in Maastricht, Nederland, 2021

Review Service

Grant Review Committees:

- Genome British Columbia's Strategic Opportunities Fund, 2014
- American Heart Association, grant review panelist, 2015-present
- Israeli Ministry of Science, Technology, and Space, 2016-present
- National Institutes of Health (NIH), National Institute of Biomedical Imaging and Bioengineering (NIBIB) Career Development (K) and Conference support (R13) applications, grant review panelist, 2017 and 2019
- The National Aeronautics and Space Administration (NASA), Cellular & Molecular Biology, grant review panelist, 2018
- NASA, Space Biology, Cell, and Molecular Biology, grant review panelist, 2018
- NIH, Cardiovascular Differentiation and Development (CDD), grant review panelist, 2018
- National Science Foundation (NSF), Disability and Rehabilitation Engineering (DARE)- Engineering Biomedical Systems (EBMS) combined, grant review panelist, 2019

Journal Peer Review (alphabetical):

- Acta Biomaterialia
- Bioengineering and Biotechnology
- Biomaterials
- Biomaterials Science
- Cell Stem Cells
- Integrative Biology
- Journal of Biomedical Materials Research
- Journal of Controlled Release
- Journal of Materials Chemistry
- Journal of Visual Experiments
- Materials Science and Engineering
- Nature Communications
- Pediatric Research
- PLOS ONE
- Regenerative Biomaterials
- Science Advances
- Scientific Reports
- Stem Cells
- Stem Cell Reports
- Tissue Engineering
- Trends in Biotechnology

Community and Public Service Activities

In addition to my formal service activities, I have also served in the local community. These activities have included judging local and state science fairs, hosting events for community groups, and mentoring a high school student for a year.

Summary of community and public service activities:

- Judged 6th graders' science projects at the Lee Elementary science fair, 01/2015

- Hosted a high school student from the Liberal Arts and Science Academy (Austin, TX) in my laboratory, 05/2015 – 05/2016
- Explore UT; organized lab-based activities to showcase our research to the general community, 03/2016 and 03/2017
- Judged in the regional Siemens Science Fair, 11/2016 and 11/2017
- Gave a talk at the headquarters of American Heart Association at Austin, 01/2017
- Judged 4th graders' science projects at the Lee Elementary science fair, 01/2017

COCKRELL SCHOOL OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

Department of Biomedical Engineering • 107 W Dean Keeton, Stop C0800 • Austin, Texas 78712
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Department of Biomedical Engineering Budget Council Statement on Awards & Honors

Candidate **Dr. Janet Zoldan, Ph.D. Assistant Professor**

Prepared by **Dr. Kenneth R. Diller, Sc.D.**

Dr Kenneth R Diller was appointed by Dr Shelly Sakiyama-Elbert, Chair of the Department of Biomedical Engineering, to evaluate the Awards & Honors of Professor Janet Zoldan The Budget Council considered all aspects of Dr Zoldan's awards and honors in rank and career

One important measure of the level of respect with which a faculty member is held is the success in obtaining external funding, a process that is highly competitive among a large national population of talented and motivated peers Dr Zoldan has received three external grants totaling $945,052 (candidate's share only), or $1,030,715 (total) One is from the American Heart Association ($308,000), one is from the NIH – NIBIB ($622,715 / $537,052), and one from the Alliance for Regenerative Rehabilitation Research and Training ($100,000) These grants are highly competitive to earn, especially so for the NIH R21 Trailblazer award that is designated for New and Early Stage Investigators who have not had significant past NIH funding and who are pursuing high risk, high reward research Her overall level of funding and the number of grants are commensurate with what is expected for promotion, projecting a long-term capability for sustaining her research program

As Dr Zoldan has been developing her career, a major focus has been to establish a program of creative research A primary recognition of the success of this effort is reflected in her publication record in peer reviewed journals During her time in rank she has 19 such publications in highly respected journals, plus five refereed conference publications She has also made presentations at twenty-eight professional society meetings This is considered as very good production As a result, her reputation for quality work has grown, resulting in invitations to nine top level universities to give seminars This is considered a large number of university seminars for the early stage of her career Also, based on her reputation she has been sought out to serve as a reviewer for research proposals submitted for top federal agencies (NIH, NSF, NASA, AHA) and international agencies from Canada and Israel She has also been a reviewer for more than twenty scientific, medical, and engineering journals, and has written several invited commentaries and reviews in leading journals

Dr Zoldan was awarded a National Scientist Development Grant by the AHA (2015) and was selected as an Emerging Young Investigator by the Royal Society of Chemistry (2017) These awards are high level honors and reflect the international high regard her potential for future accomplishments

Dr Zoldan was elected as an officer of a subgroup of the Society of Biomaterials (2019), the primary professional society in her field of research Her research publications have been featured with cover illustrations multiple times in scientific journals She has been asked to organize many technical sessions at professional meetings These activities show that she is becoming established and respected within the research community within which she works

In summary, Dr Zoldan is recognized as a talented and innovative member of our faculty She has a well-established national reputation and is emerging at the international level The Budget Council concludes that Dr Zoldan meets the expectations in the category of Awards & Honors to be promoted to Associate Professor

Honors and Awards Statement

Overview

I have received multiple awards and honors while at the University of Texas at Austin. The impact of my research has been recognized by my peers and my research community, both nationally and internationally. In 2015, I received the prestigious Scientist Development Grant, awarded by the American Heart Association. This award identifies outstanding scientists at early stages of their careers to support innovative ideas in cardiovascular research, funding only the top 5% of applications nationwide. Receiving this award prompted an invitation from the American Heart Association headquarters, located in Austin, to present my research to their executive members. In 2018, I received the highly competitive seed grant from the Alliance of Regenerative Rehabilitation Research and Training, which grants only two awards each year. I was recognized by the Cockrell School of Engineering by being nominated to represent UT for the Searle Scholarship Program and at the National Effective Teaching Institute Workshop. My growing footprint in the cardiovascular arena has been acknowledged by invited talks, reviews, and commentaries. I presented our findings at numerous invited talks throughout the US, including the Distinguished Speaker Colloquium at Rice University Department of Bioengineering, and the 8th International Conference on Bioengineering and Nanotechnology (Society for Biological Engineering) alongside the leading senior investigators in my field. I have been invited to write reviews on cardiac maturation and extra cellular-like biomaterials in *Trends in Molecular Medicine* and *Regenerative Biomaterials*, respectively, both highly impactful journals. My work in stem cell-based cardiac engineering has led to an invited commentary from *Cell Stem Cells*, one of the top journals in stem cell research. Further, my vascular engineering work was selected to be part of a special issue in *Tissue Engineering*. Based on my accomplishments, I was recently selected by The Royal Society of Chemistry through a highly competitive process to be one of only 16 2017 Emerging Young investigators", an honor which included the publication of an invited manuscript in *Biomaterials Science*. I have also been recognized by my peers in the Society for Biomaterials. Specifically, I was recently elected as Secretary-Treasurer in the Special Interest Group devoted to Engineering Cells and Their Microenvironments. Additionally, I have been invited to become a member of the Scientific Advisory Board for the Tissue Engineering and Regenerative Medicine International Society, which is planning the next World Congress.

Awards and Honors In Rank

- Selected by Cockrell School of Engineering to represent UT for the Searle Scholarship Program, 2014
- Awarded the Scientist Development Grant, a national award from the American Heart Association, 2015
- Invited to present my research at the American Heart Association headquarters, 2017
- Selected by the Cockrell School of Engineering to represent UT at the National Effective Teaching Institute workshop, 2017
- Selected by *Biomaterials Science* as 2017 Emerging Young Investigator, The Royal Society of Chemistry, 2017
- Invited to write a commentary in *Cell Stem Cells* (Impact Factor 23), 2018
- Invited to write a review on extracellular matrix-like biomaterials in *Regenerative Biomaterials*, 2018
- Invited to write a review on cardiac maturation in *Trends in Molecular Medicine* (Impact Factor 11), 2018
- Awarded the pilot grant from the Alliance of Regenerative Rehabilitation Research and Training and selected as part of the Cardiovascular Research Core, 2018
- Selected as a member of the Scientific Advisory Board for the Tissue Engineering and Regenerative Medicine International Society World Congress, 2019
- Our work was selected to be part of a Special Issue on Engineered Tissues Derived from Induced-Pluripotent Stem Cells (iPSCs) for Disease Modeling, Drug Discovery, and Replacement Therapies in *Tissue Engineering*, 2019
- Invited to present our research at the 8th International Conference on Bioengineering and Nanotechnology, Society for Biological Engineering, 2019
- Elected as Secretary-Treasurer in the Engineering Cells and Their Microenvironments, Special Interest Group, Society of Biomaterials, 2019

Research Grants

My laboratory has been successful in obtaining external funding. Our funding has come from the American Heart Association and the Alliance of Regenerative Rehabilitation Research and Training. In addition, we have had student funding through grants from UT Austin, the National Institutes of Health, and the National Science Foundation.

American Heart Association: Scientist Development Grant

In 2015, I received the prestigious Scientist Development Grant, awarded by the American Heart Association. This award identifies outstanding scientist at early stages of their career to support innovative ideas in cardiovascular research, funding top 5% applications nationwide. This work focuses on developing biomaterials that can encapsulate vascular progenitor cells derived from induced pluripotent stem cells and guide their assembly into mature, functional blood vessels. As these cells are patient-specific, our findings have the potential to develop personalized ischemia treatments.

Alliance of Regenerative Rehabilitation Research and Training: Seed Grant

In 2018, I received the highly competitive seed grant from the Alliance of Regenerative Rehabilitation Research and Training, which grants only two awards each year. This grant supports my work on applying our controlled tissue engineered neovascularization system towards stroke therapy. This work focuses on identifying the potential synergistic effects that rehabilitation training and stem cell therapy can have on stroke recovery.

Honors and Awards for Students

The students in my laboratory have received numerous awards, including fellowships, travel awards, and awards for presentations, as listed below.

- Alysa Joaquin: Recipient of the National Science Foundation Graduate Research Fellowship Program (Summer 2013-Summer 2016)
- Alysa Joaquin: Recipient of the National Science Foundation Prestigious Bruton Award (Fall 2013)
- Alysa Joaquin: Recipient of the University of Texas at Austin, Cockrell School of Engineering, Engineering Doctoral Fellowship (Fall 2013-Spring 2016)
- Alysa Joaquin: Recipient of the University of Texas at Austin Graduate School Professional Development Award (Fall 2014)
- Alysa Joaquin: Recipient of the University of Texas at Austin, Dean's Prestigious Fellowship (Fall 2014, Fall 2015)
- Alysa Joaquin: Recipient of the National Science Foundation Supplement (Spring 2015)
- Alicia Allen: Recipient of the University of Texas at Austin Graduate School, Dean's Prestigious Fellowship (Fall 2015, Fall 2016, Fall 2017)
- Alicia Allen: Recipient of the University of Texas at Austin, Cockrell School of Engineering, Virginia & Ernest Cockrell, Jr. Fellowship in Engineering (Fall 2013-Spring 2017)
- Alicia Allen: Recipient of the Travel Award to attend the Weinstein Cardiovascular Development and Regeneration Conference, Durham, NC (2016)
- Alicia Allen: Recipient of the University of Texas at Austin Graduate School, Professional Development Award (Fall 2017)
- Alicia Allen: Recipient of the National Science Foundation Graduate Research Fellowship Program (Summer 2015-Spring 2018)
- Alicia Allen: Won 2nd place in the poster presentation competition at the Texas Biomaterials Day, Austin, TX (2017)
- Alicia Allen: Recipient of the University of Texas at Austin, Cockrell School of Engineering, Runge Endowed Presidential Fellowship in Biomedical Engineering (Fall 2017-Spring 2018)
- Chengyi Tu: Recipient of the University of Texas at Austin Graduate School Recruitment Fellowship (Fall 2013-Spring 2017)
- Chengyi Tu: Recipient of the University of Texas at Austin Graduate School, Professional Development Grant (Spring 2018)
- Chengyi Tu: Recipient of the University of Texas at Austin Graduate School, Continuing Graduate Fellowship (Summer 2018)
- Chengyi Tu: Recipient of the University of Texas at Austin, Cockrell School of Engineering, Cullen Crain Endowed Scholarship in Engineering (Fall 2017-Spring 2018)
- Julie Strickland: Recipient of the National Institutes of Health T32 Graduate Training Fellowship (Fall 2015-Summer 2016)
- Julie Strickland: Recipient of the University of Texas at Austin Graduate School, Engineering Foundation Scholarship (Fall 2015-Spring 2016)
- Julie Strickland: Recipient of the University of Texas at Austin, Cockrell School of Engineering, Earnest & Elsie Clawson Scholarship (Fall 2016-Spring 2017)
- Cody Crosby: Recipient of the National Institutes of Health T32 Graduate Training Fellowship (Fall 2015-Summer 2016)

- Cody Crosby: Recipient of the University of Texas at Austin, Cockrell School of Engineering, Thrust 2000 Fellowship (Fall 2015-Spring 2019)
- Cody Crosby: Recipient of the University of Texas at Austin, Graduate School, Provost Graduate Excellence Fellowship (Fall 2015-Summer 2018)
- Cody Crosby: Received Honorable Mention in the National Science Foundation Graduate Research Fellowship Program Competition (Fall 2017)
- Cody Crosby: Recipient of the University of Texas at Austin Graduate School, Professional Development Award (Spring 2018)
- Cody Crosby: Selected for oral presentation at the 1st UT BME Student Retreat, Austin, TX (2018)
- Cody Crosby: Selected as one of two students for oral presentation at the 2nd Rock Stars of Regenerative Engineering, San Francisco, CA (2019)
- Cody Crosby: Selected for oral presentation in the Rapid Fire Session at the Texas Biomaterials Day, Houston, TX (June 2019)
- Robert Xu: Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2014- Summer 2015)
- Priyanka Deshpande: Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2014- Summer 2015)
- Priyanka Deshpande: Won 2nd Place in the Cockrell School Undergraduate Research Poster Competition (Spring 2015)
- Karl Solomon: Recipient of the best undergraduate student poster award in the Annual University of Texas at Austin Nano Night poster session (Fall 2014)
- Madhavi Nambiar: Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2015 -Summer 2016)
- Meghana Koleti: Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2015 -Summer 2016)
- Anika Tanwani: Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2015- Summer 2016)
- Jorge Gomez Medellin: Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Spring 2016-Summer 2016)
- Krista Polansky: Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2016-Summer 2017)
- David Shu: Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2016-Summer 2017)
- Olivia Conroy: Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2017-Summer 2018)
- Deepti Valliappan: Recipient of the Undergraduate Research Fellowship, the University of Texas at Austin (Fall 2017-Summer 2018)
- Deepti Valliappan: Finalist for the BME Undergraduate Poster Competition (2018)

Invited Lectures In Rank

I have frequently been invited to present research seminars throughout the United States. Highlights include the seminars listed below for which my travel expenses have been paid by the organizing institution. A full list of invited oral presentations can be found on my CV.

- J. Zoldan, The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Distinguished Speaker, Rice University Department of Bioengineering Colloquium**, Houston, TX (April 2018).
- J. Zoldan, The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Biological Research Lecture series, University of Mary Hardin-Baylor**, Belton, TX (April 2018).
- J. Zoldan, Microenvironments for engineering the differentiation of human induced pluripotent stem cells", **The national diversity in STEM conference (SACNAS)**, San Antonio, TX (October 2018).
- J. Zoldan, The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Biomedical Engineering Lecture Series, the University of California at Irvine**, CA (November 2018).
- J. Zoldan, The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Cellular and Molecular Biology Seminar Speaker, the University of Texas at San Antonio**, San Antonio, TX (February 2019).
- J. Zoldan, The role of biophysical and biochemical cues in engineering stem cell microenvironments",

Department of Biomedical Engineering Seminar Speaker, Tufts University, Medford, MA (February 2019).

- J. Zoldan, Quantifying the vasculogenic potential of iPSC-EPs in collagen hydrogels", **The 5th Annual San Antonio Conference on Stem Cell Research and Regenerative Medicine (RegenMED)**, San Antonino, TX (February 2019).
- J. Zoldan, The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Biomedical Engineering Seminars, University of Rochester**, Rochester, NY (March 2019).
- J. Zoldan, The role of biophysical and biochemical cues in engineering stem cell microenvironments", The **Bioengineering Seminar Series, University of Maryland**, College Park, MD (April 2019).
- J. Zoldan, The role of biophysical and biochemical cues in engineering stem cell microenvironments", **Seminar Series in the Department of Chemical and Biological Engineering at the University of Wisconsin-Madison**, Madison, WI (September 2019).
- J. Zoldan, The vasculogenic potential of iPSC-EPs in ECM based hydrogels", **Seminar Series in the Meinig School of Biomedical Engineering, Cornell University**, Ithaca, NY (September 2019).

Conference Organizing Committees

I have frequently been invited to chair sessions at national and regional scientific meetings as follows. More recently, I have chaired the Tissue Engineering Track at the annual meeting of the Biomedical Engineering Society. I have also taken several leading roles in organizational committees at the Society of Biomaterials, as listed below.

- Biomedical Engineering Society (BMES) – Chaired two sessions at the annual meeting in San Antonio, TX, 2014
- BMES – Chaired one session at the annual meeting in Minneapolis, MN, 2016
- BMES – Chaired one session at the annual meeting in Phoenix, AZ, 2017
- BMES – Track Chair, Tissue Engineering Track at the annual meeting in Atlanta, GE, 2018
- Society of Biomaterials (SFB) – Finance Committee member, 2018
- SFB – Reviewed abstracts, chaired one session and judged poster session at the annual meeting in Seattle, WA, 2019
- SFB – Secretary-Treasurer in the Engineering Cells and Their Microenvironments, Special Interest Group, 2019
- 8th International Conference on Bioengineering and Nanotechnology – Chaired one session, Baltimore, MD, 2019
- Tissue Engineering and Regenerative Medicine International Society (TERMIS) – Member of the Scientific Advisory Board for the next world TERMIS congress in Maastricht Nederland, 2021

Janet Zoldan, Ph.D.

LETTERS RECEIVED

Letters should be listed *alphabetically* by last name.

Name of reviewer, rank or title, department, university	**Prof. Angela Belcher, Ph.D.** James Mason Crafts Professor of Biological Engineering & Materials Science and Engineering Head Department of Biological Engineering Massachusetts Institute of Technology
Brief statement of expertise and reason for selection*	Dr. Belcher was selected because she is an expert in chemically-inspired engineering and biomaterials. She is department head at a top 5 engineering and BME program. Dr. Belcher has been elected to American Academy of Arts and Sciences, National Academy of Engineering, and National Academy of Inventors, as well as a recipient of the highly competitive Lemelson-MIT prize and a former MacArthur Fellow.
Other relevant information**	Candidate and letter writer have interacted at professional meetings and conferences; candidate and letter writer were both at MIT for a time (candidate as Postdoc) but did not formally overlap.
Nominated by	Candidate
Date letter received	7/29/19

Name of reviewer, rank or title, department, university	**Prof. John Fisher** Fischell Family Distinguished Professor and Chair Fischell Department of Bioengineering A. James Clark School of Engineering University of Maryland
Brief statement of expertise and reason for selection*	Dr. Fisher was selected because of his accomplished research and for his role as Department Chair of a young, state university BME department. Dr. Fisher is a fellow of AIMBE and BMES, as well as Society for Biomaterials. He is highly cited in regenerative medicine and biomaterials with an h-index of 47.
Other relevant information**	Candidate and letter writer share scientific interests in the area regenerative medicine and biomaterials.
Nominated by	Candidate
Date letter received	7/30/19

Name of reviewer, rank or title, department, university	**Prof. Andres Garcia, Ph.D.** Executive Director, Parker H. Petit Institute for Bioengineering and Bioscience Petit Director's Chair in Bioengineering and Bioscience Regent's Professor, George W. Woodruff School of Mechanical Engineering Georgia Institute of Technology
Brief statement of expertise and reason for selection*	Dr. Garcia was selected because he is a leading figure in materials for regenerative medicine. He is a chaired professor at a top 5 engineering program. He has been elected a Fellow of Biomaterials Science and Engineering by the International Union of Societies of Biomaterials Science and Engineering, AIMBE, and AAAS. He is well cited with an h-index of 65 and more than 11,000 citations.
Other relevant information**	Candidate and letter writer have interacted at professional meetings and conferences and share interests in regenerative medicine and stem cell therapeutics.
Nominated by	Budget Council
Date letter received	6/14/19

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length

Name of reviewer, rank or title, department, university	**Prof. Sharon Gerecht, Ph.D.** Professor Department of Chemical & Biomolecular Engineering Director, Institute of NanoBioTechnology Johns Hopkins University
Brief statement of expertise and reason for selection*	Dr. Gerecht was selected for her knowledge and leadership of a leading nanobiotech research institute at a top tier BME program. She has been elected a Fellow of AIMBE. She is well cited with an h-index of 48.
Other relevant information**	Candidate and letter writer have interacted at professional meetings and conferences and share interests in regenerative medicine and stem cell therapeutics. Both attended Technion for their PhDs and postdoc with Prof. Bob Langer at MIT (note that he supervises a lab of 100+ FTEs, mostly postdoctoral fellows and they overlapped less than 1 yr).
Nominated by	Candidate
Date letter received	7/22/19

Name of reviewer, rank or title, department, university	**Prof. David Kaplan** Stern Family Professor of Engineering Distinguished Professor Professor and Chair, Department of Biomedical Engineering Professor, Department of Chemical Engineering Director, Bioengineering and Biotechnology Center Tufts University
Brief statement of expertise and reason for selection*	Dr. Kaplan was selected because role as Department Chair and as an expert researcher in tissue engineering and biopolymers. Dr. Kaplan is a fellow of AIMBE and has a highly cited career in engineering tissue for disease prevention and treatment.
Other relevant information**	Candidate and letter writer share scientific interests in the area regenerative medicine and drug delivery technologies.
Nominated by	Budget Council
Date letter received	7/20/19

Name of reviewer, rank or title, department, university	**Prof. Antonios Mikos** Louis Calder Professor of Bioengineering, Chemical and Biomolecular Engineering Director, Center for Excellence in Tissue Engineering Rice University
Brief statement of expertise and reason for selection*	Dr. Mikos was selected because of his accomplished research as an endowed professor of tissue engineering and a very highly cited scholar (with over ~60,000 citations via GoogleScholar) on drug delivery, biomaterials, and nanotechnology. Dr. Mikos is a Member of the National Academy of Engineering; a Member of the National Academy of Medicine; a Member of the Academy of Medicine, Engineering and Science of Texas; and a Member of the Academy of Athens.
Other relevant information**	Candidate and letter writer share scientific interests in the area regenerative medicine and tissue engineering.
Nominated by	Candidate
Date letter received	7/28/19

Name of reviewer, rank or title, department, university	**Prof. Brenda Ogle** Professor & Department Head Department of Biomedical Engineering Director, Stem Cell Institute University of Minnesota

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length

Brief statement of expertise and reason for selection*	Dr. Ogle was selected because of her research career in cardiac tissue engineering and experience as Chair of a peer state research BME department. Dr. Ogle is a fellow of AIMBE and has a highly cited career in engineering tissue for cardiac disease and therapeutics.
Other relevant information**	Candidate and letter writer share scientific interests in the area regenerative medicine and cardiac tissue engineering.
Nominated by	Budget Council
Date letter received	7/23/19

Name of reviewer, rank or title, department, university	**Prof. Sean Palecek** Milton J. and A. Maude Shoemaker Professor Department of Chemical and Biological Engineering University of Wisconsin Madison
Brief statement of expertise and reason for selection*	Dr. Palecek was selected for his expert knowledge in iPSCs in cardiovascular research models, as well as his highly cited research record, with an h-index of 51 and ~12000 citations, and experience at a large peer public state flagship BME department.
Other relevant information**	Candidate and letter writer share scientific interests in the area regenerative medicine and drug delivery technologies.
Nominated by	Budget Council
Date letter received	7/8/19

Name of reviewer, rank or title, department, university	**Prof. William R. Wagner** Professor & Director Surgery, Bioengineering, and Chemical Engineering University of Pittsburgh
Brief statement of expertise and reason for selection*	Dr. Wagner was selected because of his membership of BME's External Advisory Committee, role as Director of the McGowan Institute of Regenerative Medicine, title of Chair for TERMIS (Tissue Engineering and Regenerative Medicine International Society), and distinguished professors at a peer leader department and institute.
Other relevant information**	Candidate and letter writer are within the same research area of biomaterials and regenerative medicine, with collegial experience working together via our External Advisory Committee, on which Dr. Wagner is a current member.
Nominated by	Budget Council
Date letter received	7/30/19

Name of reviewer, rank or title, department, university	**Prof. Joyce Wong** **Professor** Boston University Inaugural Term Distinguished Professor of Engineering Department of Biomedical Engineering
Brief statement of expertise and reason for selection*	Dr. Wong was selected as a reviewer because she is a leading figure in the candidate's research area of vascular tissue engineering. Dr. Wong is a fellow of BMES and AIMBE and is a Distinguished College of Engineering Faculty Fellow at Boston University.
Other relevant information**	Candidate and letter writer share common scientific interests in vascular tissue engineering and have interacted at professional meetings and conferences.
Nominated by	Budget Council
Date letter received	8/16/19

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length

DECLINATIONS

Those declining to provide a review letter should be listed *alphabetically* by last name.

Name of reviewer, rank or title, department, university	**Dr. Kyriacos (Kerry) Athanasiou** Distinguished Professor Department of Biomedical Engineering University of California, Irvine
Brief statement of expertise and reason for selection*	Dr. Athanasiou was selected because of his leadership as former Chair and Distinguished Professor of the department of Biomedical Engineering at UC-Davis, (currently at UC-Irvine) and prior service to UT-BME as an External Advisory Committee Member. Dr Athanasiou is highly cited with an h-index of 88 and nearly 28,000 citations.
Other relevant information**	Candidate and letter writer are within the similar research areas of regenerative medicine, with collegial experience working together via our External Advisory Committee, on which Dr. Athanasiou is a former member.
Nominated by	Budget Council
Date letter received	6/10/19 "Dear Carrie, It is great to hear from you but, unfortunately, I will not be able to help. Pls do not let my inability to do this reflect in any way negatively on the candidate." Attached

NO RESPONSE

Those not responding to the request to provide a review letter should be listed *alphabetically* by last name.

Name of reviewer, rank or title, department, university	**Prof. Gordana Vunjak-Novakovic** Professor Biomedical Engineering and Medical Sciences Columbia University
Brief statement of expertise and reason for selection*	Dr. Vunjak-Novakovic was selected for her membership in three national academies (NAE, NAM, and NAI), as well as her status as the Mikati Foundation Distinguished Professor of Biomedical Engineering and Medical Sciences at a leading peer institution. She has an h-index of 100 and more than 30,000 citations.
Other relevant information**	Candidate and letter writer share scientific interests in tissue engineering and regenerative medicine and have interacted at professional meetings and conferences.
Nominated by	Candidate
Date letter received	

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length

COCKRELL SCHOOL OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

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June 10, 2019

Dr Angela Belcher
James Mason Crafts Professor of Biological Engineering
and Materials Science and Engineering
Department of Biological Engineering
Massachusetts Institute of Technology
77 Massachusetts Ave
Cambridge, MA 02139
via belcher@mit.edu

Dear Dr Belcher

The Department of Biomedical Engineering is considering Dr Janet Zoldan for tenure and advancement in rank to the position of Associate Professor at The University of Texas at Austin We would appreciate your candid assessment of their scholarly contributions to assist our decision-making process Excellent teaching is an important criterion for promotion, but our evaluation of teaching is being carried out separately, and we are asking you only for information about their scholarly distinction Copies of Dr Zoldan's curriculum vitae and several recent papers are enclosed for your review

Please note that Dr Zoldan received a one-year extension of their tenure clock by virtue of university policy Under these circumstances, the criteria for promotion and tenure are no different than for faculty whose tenure clock has not been extended We therefore request that this situation not be a factor in your letter of evaluation

We would appreciate your opinions regarding Dr Zoldan's major engineering and/or scientific contributions In preparing your assessment, please consider the following questions

1 Do you know Dr Zoldan, and if so, for how long and under what circumstances?
2 What are the original, innovative, and/or important contributions that they have made in their field of research? Have their publications influenced the thinking of, or the methods used by, others in your field?
3 How would you assess Dr Zoldan's development compared with others in their cohort at research-intensive universities?
4 What is your perspective on Dr Zoldan's promise for further professional growth and leadership?

We would be grateful for any additional comments you might have The more specific you can be in your comments, the more helpful your evaluation will be

Under the laws of the State of Texas, Dr Zoldan has the right to request to see any materials in their personnel file, including your letter Members of our faculty and internal review committees who see your letter as part of the promotion process will hold the comments you make in confidence, however

For your comments to receive full consideration, we will need to receive a signed letter from you no later than **Monday, July 22, 2019** It is not necessary for you to send us a hard copy of your letter, an electronic or scanned version is sufficient, provided your institutional letterhead and your signature are included In addition, *please enclose a copy of a short version of your curriculum vitae (preferably no longer than two pages)* or the URL for your web site where we may obtain this information If you have questions, please call me at the number given on the letterhead

Thank you for your time and assistance with this important matter As faculty members, we realize that the amount of time required to do a thoughtful review is considerable

Sincerely,

Shelly Sakiyama-Elbert, Ph D
Department Chair and Professor
Fletcher Stuckey Pratt Chair in Engineering

SSE cnc

Enclosure

List of Materials Sent – Janet Zoldan

- **Five most significant publications:**

1. 23. A. Allen, E. Barone, C.O. Crosby, L.J. Suggs, J. Zoldan*, "Electrospun poly (N-isopropyl acrylamide)/poly (caprolactone) fibers for the generation of anisotropic cell sheets", *Biomaterials Science*, 5(8), p. 1661-1669. DOI: 10.1039/c7bm00324b (July 2017). **Corresponding author.*

2. 29. C.O. Crosby, D. Valliappan, D. Shu, S. Kumar, C. Tu, W. Deng, S.H. Parekh, J. Zoldan*, "Quantifying the vasculogenic potential of iPSC-derived endothelial progenitors in collagen hydrogels", Special Issue on Engineered Tissues Derived from Induced-Pluripotent Stem Cells (iPSCs) for Disease Modeling, Drug Discovery, and Replacement Therapies, *Tissue Engineering, Part A*. DOI: 10.1089/ten.TEA.2018.0274, Epub ahead of print (January 2019). **Corresponding author.*

3. 38. C. Tu, A. Allen, W. Deng, O. Conroy, M. Nambiar, J. Zoldan, "Commonly used thiol-containing antioxidants reduce cardiac differentiation and alter gene expression ratios of sarcomeric isoforms", Miami Winter Symposium-Stem Cells, Miami, FL (January 2018).

4. 32. A. Allen, E. Barone, N. Momtahan, C.O. Crosby, C. Tu, W. Deng, K. Polansky, J. Zoldan*, "Temporal impact of substrate anisotropy on differentiating cardiomyocyte alignment and functionality", *Tissue Engineering, Part A*. https://doi.org/10.1089/ten.TEA.2018.0258, Epub ahead of print (February 2019). **Corresponding author.*

5. 20. C. Tu, Z. Smilansky, N. Raje, J. Zoldan, "Monitoring protein synthesis in single live multiple myeloma cells", Biomedical Engineering Society (BMES), San Antonio, TX (October 2014).

- **CV**
- **Full list of Publications – Scholarly work document**

Candidate

Department of Biological Engineering
Department of Materials Science and Engineering
David Koch Institute for Integrative Cancer Research
Massachusetts Institute of Technology
Room 76-561
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Cambridge, MA 02139

Angela M. Belcher
James Mason Crafts Professor
Department Head, Department of Biological Engineering

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E-mail: belcher@mit.edu

Dear Professor Sakiyama-Elbert,

Thank you for the opportunity to review Professor Janet Zoldan's case for promotion to Associate Professor with tenure. I have known Janet Zoldan for approximately eight years since we were colleagues at The Koch Institute for Integrative Cancer Research at MIT. We both share a common interest in the synthesis, characterization and deployment of biomaterials, although for different applications. Most of my interactions with Janet have been discussions about the detailed characterization of organic-inorganic interfaces of bio-nanomaterials, where she has extensive expertise. My most recent interactions with her have been discussions centered around teaching and mentoring graduate students, and I have been impressed with her commitment to both. After reviewing her case, I enthusiastically support this promotion with tenure. She has built a strong research program at the interface between biomaterials, biophysics and stem cell bioengineering to unravel and perturb cell fate and signaling interactions. Her pre-tenure work has set the foundation for understanding and controlling biophysical cues and the cellular microenvironment in cardiac differentiation, and will only continue in their importance and impact in cardiovascular tissue formation. In addition, she has shown great commitment to the BME community and in service to both undergraduates and graduate student mentoring.

From the eighteen papers that she has published since her appointment at UT, with eleven as corresponding author, I will highlight a few based on innovation, significant contributions, and some overlap with my areas of experience. I was impressed with her paper titled "Electrospun poly(N-isopropyl acrylamide) poly(caprolactone) fibers for the generation of anisotropic cell sheets" *Biomaterials Science*, 2017. She developed a novel approach to thermally controlled cell sheet detachment for transplantation applications by blending an electrospun composite material that when aligned initially induces alignment of cell sheets and supports cell attachment. Her team then optimized the copolymer ratio required to achieve the desired biphasic behavior necessary to have both alignment and controlled, non-destructive release. Thus, these fibers do not require enzymatic detachment, thereby better preserving cell-cell adhesion and thus cell signaling, biophysical cues, and transient synchronized calcium signals that are imperative to cardiac cell function post-transplantation, as well as potential function in other organs. These electrospun fibers produced do not require any additional chemical modifications

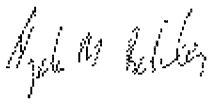
making them an easy and low-cost alternative method to generating anisotropic cell sheets. She is currently testing this method for aligned cardiac sheets with synchronized beating to couple with a host *in vivo*.

Supporting her second area of active research, Professor Zoldan published a cluster of papers that investigate the effects of frequently used components of cell differentiation media on cell differentiation efficiency, cell signaling interactions, and cell viability, for example, *Experimental Cell Research* 2018 and *Stem Cell Research* 2017. One important study demonstrated that the thiol-containing antioxidants (BME and MTG) negatively affect cellular redox states associated with cardiac differentiation. Removal of these molecules increased cellular differentiation efficiency by 2-3-fold and replacement by Trolox decreases oxidative stress while maintaining a high differentiation efficiency without affecting gene expression in sarcomeric genes. In addition, she showed that thiol-containing antioxidants become toxic and induce apoptosis in iPSCs under conditions of glycogen synthase kinase 3 inhibition, which is a commonly used method to create iPSCs. Under these conditions, she showed that cell viability decreases by over 90%. She went on to demonstrate that this phenotype can be rescued by rapamycin.

In conclusion Professor Zoldan has ramped up an active research program and made significant progress in her Biomaterials lab at UT. Her work has been recognized in the field by being awarded the Scientist Development Grant by The American Heart Association, and she was named the 2017 Emerging Young Investigator by Biomaterials Sciences. I anticipate that she will continue to build on the foundation she has built and the contributions she has made to make even greater contributions to the field. She has graduated two PhDs students, one master students and supervised twenty undergraduate students. She also serves on many other thesis committees and other committees at UT. Although I was not asked to evaluate her teaching I know from my interactions with her that she is very committed to the students in her classes. This is also evident by the talks given and awards received by her undergraduate and graduate students.

In conclusion, I look forward to seeing Professor Zoldan's continued important contributions in this field and I fully support her promotion to Associate Professor.

Sincerely,



Angela Belcher

Angela M. Belcher, James Mason Crafts Professor

Biological Engineering, Materials Science and Engineering, and the David H. Koch Institute for Integrative Cancer Research, MIT

EDUCATION

University of California, Santa Barbara B.A.	1991	Creative Studies, Biology
University of California, Santa Barbara Ph.D.	1997	Inorganic Chemistry

POSITIONS

Positions Held.

1997 – 1999	Postdoctoral Fellow, Center for Quantized Electronic Structures, University of California, Santa Barbara
1999 – 2002	Assistant Professor, Department of Chemistry & Biochemistry, University of Texas, Austin
2001 – 2003	Defense Science Study Group, Institute for Defense Analysis
2002 - 2002	Associate Professor, Department of Chemistry & Biochemistry, University of Texas, Austin
2002 – 2005	John Chipman Associate Professor of Materials Science and Engineering and Biological Engineering, Massachusetts Institute of Technology
2003- 2014	Founder and Board of Directors, Cambrios Technologies, Inc.
2005-2010	Germeshausen Professor of Materials Science and Engineering and Biological Engineering
2007-2016	Founder and Board of Directors, Siluria Technologies, Inc.
2010-2015	W.M. Keck Professor of Energy
2015-current	James Mason Crafts Professor
2015-current	Co-Leader MIT k-12 Education Initiative
2017-current	Co-Director of the Bio Energy Sciences Low Carbon Center, MIT
2017-current	Co-Director of the Jameel-World Education Lab, MIT
2017-2019	Associate Department Head, Biological Engineering, MIT
2019-current	Founder [CE]²- Carbon Capture to Energy and Electricity
2019-current	Department Head, Biological Engineering, MIT

MIT Research

Belcher's interest focuses at interfaces, which includes the interfaces of scientific disciplines as well as the interfaces of materials. In her group at MIT, they are using Nature as a guide to make novel electronic and magnetic materials and to pattern materials on nano length scales. To accomplish this, Belcher's group is integrating approaches from several scientific disciplines including materials chemistry, inorganic synthesis, surface chemistry, molecular biology, biochemistry and electrical engineering. They are adapting the conditions and control mechanisms found in nature to non-biological inorganic materials such as magnetic and semiconductor materials. Belcher and her students have pioneered a very novel self-organizational approach that utilizes evolutionarily selected and engineered peptides to specifically recognize and bind electronic and magnetic building blocks. The goal is to have a DNA sequence that codes for the synthesis and assembly of any inorganic material or device. They have been successful in using these evolutionarily selected peptides to control physical properties of nanocrystals and subsequently use molecular recognition and self-assembly to design biological hybrid multidimensional materials. They are using this technology to design new methods for building batteries, CO2 capture and utilization, fuel cells, solar cells and medical diagnostics.

RECENT HONORS.

NAE (National Academy of Engineers) Member (2018), 2018 Xconomy Awards (2018), ISNSCE (International Society for Nanoscale Science, Computation and Engineering) Nanoscience Prize (2017), Commencement Speaker, Boston University, College of Engineering (2015), NAI (National Academy of Inventors) Inductee (2015), MIT-Lemelson Prize (2013), NEIC (New England Institute of Chemists) Distinguished Chemist (2013), Boston Museum of Science "Walker Prize" (2012), American Academy of Arts and Sciences (2012), Eni Prize for Renewable & Non-Conventional Energy (2010), Elle Magazine "Gold Award" (2010), UAB Ireland Distinguished Visiting Scholar Award (2010), Worcester Polytechnic Institute Honorary Doctorate (2010), Rolling Stone Magazine "100 People Who Are Changing America" (2009), Time Magazine "Hero"- Climate Change (2007), Technology Breakthrough Award Popular Mechanics (2006), Commencement Speaker, University of California, Graduate School, Santa Barbara (2006), Finalist for Innovator of the Year in Nanoscience (2005), Women to Watch Mass High tech Magazine (2005), MacArthur Fellowship Award (2004), Elected Young Global Leader, World Economics Forum (2004), Four Star General Recognition Award (US Army) for significant contribution to army transformation (2004), Fortune Magazine Top 10 Innovators under 40 (2003), Commencement Speaker UCSB, CCS (2003), World Technology Award in Materials Science (2002), Finalist for Researcher of the Year in Nanoscience (2002), Named Top 10 Brilliant Scientist by Popular Science (2002), 1 of 12 Women on the Forefront of Chemistry—C&E News (2002), Technology Review Top 100 Inventors (TR100) (2002), Packard Fellow (2001), Wilson Prize in Chemistry—Harvard University (2001), Harrington Faculty Fellowship (2001), Alfred P. Sloan Research Fellow (2001), IBM Faculty Partnership Award (2001), Pres. Early Career Award in Sci. & Eng. (PECASE) (2000), IBM Faculty Partnership Award (2000), Beckman Young Investigator Award (2000), Who's Who in American Teachers (2000), DuPont Young Investigator Award (1999), Army Young Investigator Award (1999).

TEACHING

University of Texas at Austin

General Chemistry I and II (Chem 301 and 302), General Chemistry Lab (Chem 317)

Massachusetts Institute of Technology

Introduction to Solid State Materials (Course 3.091), Average Student Evaluation Score.6.1/7.0 (over 1 year)
Introduction to Biological Engineering (Course 20.109), Average Student Evaluation Score. 6.7/7.0 (over 10 years)
Organic Chemistry and Biochemistry of Materials (Course 3.034), Average Student Evaluation.6.3/7.0 (over 7 years)

University-Level Mentoring

40 Ph.D. Graduates, currently in academia, industry, government, and business positions.
14 current Ph.D. Candidates, 7 current Post-Doctoral Fellows, 8 former Post-Doctoral Fellows
118 undergraduate research projects at MIT (past and present)

SELECT PUBLICATIONS

1. Lin, C.W., Bachilo, S.M., Zheng, Y., Tsedev, U., Huang, S., Weisman, B., Belcher, A.M., "Creating fluorescent quantum defects in carbon nanotubes using hypochlorite and light". **Nature Communications** (2019), 10, pp. 2874.
2. Ceppi, L.*, Bardhan, N.M.*, Na, Y., Siegel, A., Rajan, N., Fruscio, R., Del Carmen, M.G., Belcher, A.M., and Birrer, M.J., "Real-Time Single-Walled Carbon Nanotube-Based Fluorescence Imaging Improves Survival after Debulking Surgery in an Ovarian Cancer Model". **ACS Nano** (2019), 3(5), pp. 5356-5365. **DOI:** 10.1021/acsnano.8b09829
3. Records, W.C., Yoon, Y., Ohmura, J.F., Chant, N., Belcher, A.M., "Virus-templated Pt–Ni(O)Hexagonal networks for enhanced electrocatalytic reduction of water." **Nano Energy** (2019), Vol. 58, 167-174. **DOI** 10.1016/j.nanoen.2018.12.083.
4. Dang, X.,* Bardhan, N.M.*, Qi, J., Gu, L., Eze, N.A., Lin, C.W., Kataria, S., Hammond, P.T., and Belcher, A.M., "Deep-tissue optical imaging of near cellular-sized features." **Scientific Reports** (2019), 9, Article 3873. **DOI**. 10.1038/s41598-019-39502-w.
5. Atsumi, H., and Belcher, A.M. "DNA Origami and G-Quadruplex Hybrid Complexes Induce Size Control of Single-Walled Carbon Nanotubes via Biological Activation." **ACS Nano** (2018) 12 (8), pp 7986-7995.
6. Bardhan, N.M.,* Kumar, P.V.,* Li, Z., Ploegh, H.L., Grossman, J.C., Belcher, A.M., and Chen, G.Y., "Enhanced Cell Capture on Functionalized Graphene Oxide Nanosheets through Oxygen Clustering." **ACS Nano.** (2017) 11 (2), 1548-1558.
7. Dang, X., Gu, L., Qi, J., Correa, S., Zhang, G., Belcher, A.M., Hammond, P.T., "Layer-by-layer assembled fluorescent probes in the second near-infrared window for systemic delivery and detection of ovarian cancer" **Proceedings of the National Academy of Sciences** (2016) 113 (19). 5,179-84.
8. Park, H.,* Heldman, N.,* Rebentrost, P., Abbondanza, L., Iagatti, A., Alessi, A., Patrizi, B., Salvalaggio, M., Bussotti, L., Mohseni, M., Caruso, F., Johnsen, H.C., Fusco, R., Foggi, P., Scudo, P.F., Lloyd, S., Belcher, "Enhanced energy transport in genetically engineered excitonic networks." **Nature Materials.** (2015). **DOI:** 10.1038/nmat4448.
9. Bardhan, N.M., Ghosh, D., and Belcher, A.M., "Carbon nanotubes as *in vivo* bacterial probes." **Nature Communications** (2014) **DOI**.10.1038/ncomms5918.
10. Ghosh, D., Bagley, A.F., Na, Y.J., Birrer, M., Bhatia, S.N., Belcher, A.M., "Deep, noninvasive imaging and surgical guidance of submillimeter tumors using targeted M13-stabilized single walled carbon nanotubes." **Proceedings of the National Academy of Sciences** (2014). 201400821. **DOI:** 10.1073/pnas.1400821111
11. Kumar, P.V.,* Bardhan, N.M.,* Tongay, S., Wu, J., Belcher, A.M., and Jeffrey C. Grossman, "Scalable enhancement of graphene oxide properties by thermally driven phase transformation." **Nature Chemistry** (2014) 6, 151–158
*These authors contributed equally
12. Chen, P.Y., Qi, J., Klug, M.T., Dang, X., Hammond, P.T., and Belcher, A.M., "Environmentally-responsible fabrication of efficient perovskite solar cells from recycled car batteries." **Energy & Environ Sci.**, 7, 3659-3665, (2014).
13. Oh, D., Qi, J., Lu, Y.C., Zhang, Y., Shao-Horn Y., and Belcher, A.M., "Biologically enhanced cathode design for improved capacity and cycle life for lithium-oxygen batteries." **Nature Communications**, 4 (2013).
14. Ghosh, D., Lee, Y., Thomas, S., Kohli, A., Yun, D.S., Belcher, A., Kelly, K., "M13-templated magnetic nanoparticles for targeted *in vivo* imaging of prostate cancer." **Nature Nanotechnology**, 7, 677-682, (2012).
15. Dang, X., Yi, H., Ham, M.H., Qi, J., Yun, D., Ladewski, R., Strano, M., Hammond, P., Belcher, A. "Virus templated Self-assembled Single-walled Carbon Nanotubes for Highly Efficient Electron Collection in Photovoltaic Devices." **Nature Nanotechnology** 6, 377-384, (2011).
16. Lee, Y.J., Yi, H., Kim, W., Kang, K., Yun, D.S., Strano, M.S., Ceder, G., Belcher, A.M. "Fabricating Genetically Engineered High-Power Lithium-Ion Batteries Using Multiple Virus Genes." **Science** (2009) 324.1051-5.
17. Nam, K. T., Kim, D. W., Yoo, P. J., Chiang, C. Y., Meethong, N., Hammond, P. T., Chang, Y. M., Belcher, A. M. "Virus Enabled Synthesis and Assembly of Nanowires for Lithium Ion Battery Electrodes." **Science**, 312, 885-888, 2006.
18. Mao, C., D.J. Solis, B.D. Reiss, S. Kottmann R. Sweeney, G. Georgiou, B. Iverson, and A.M. Belcher, "Virus-Based Genetic Toolkit for the Directed Synthesis of Magnetic and Semiconducting Nanowires." **Science**, 303, 213.-215, 2004.
19. Lee, S.W., C. Mao, C. Flynn and A.M. Belcher, "Ordering of Quantum Dots Using Genetically Engineered Viruses." **Science** 296, 892-895, 2002.
20. Whaley, S. R., D.S. English, E.L. Hu, P.F. Barbara and A.M. Belcher, "Selection of Peptides with Semiconductor Binding Specificity for Directed Nanocrystal Assembly." **Nature** 405, 665-668, 2000.

UNIVERSITY OF MARYLAND
A. JAMES CLARK SCHOOL OF ENGINEERING
FISCHELL DEPARTMENT OF BIOENGINEERING

John P. Cooke, Ph.D.
Fischell Family Distinguished Professor and Department Chair

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July 29, 2019

Shelly Sakiyama-Elbert
Professor and Chair
Department of Biomedical Engineering
University of Texas
Austin, Texas

Dear Prof. Sakiyama-Elbert

I am pleased to write an evaluation letter for Dr. Janet Zoldan's promotion to the rank of Associate Professor with tenure in the Department of Biomedical Engineering at the University of Texas.

Please note that I am familiar with Dr. Zoldan's and her work through published literature and collegial interactions at scientific conferences. I also note that I invited Dr. Zoldan to visit our department and present her work in the spring of 2019.

Dr. Zoldan's work involves the application of human induced pluripotent stem cells (iPSCs) as a model system for examining key questions in cardiovascular tissue development and function. Key publications include a 2017 publication in Biomaterials Science that examines the fabrication of cell sheets, a 2019 publication in Tissue Engineering Part A that assess the utility of iPSCs in vasculogenic applications, and another 2019 publication in Tissue Engineering Part A that examines the differentiation of cardiomyocytes on differing substrates. The field of stem cell based tissue engineering is large and competitive, and Dr. Zoldan has diligently established her laboratory in the iPSC field. I note that iPSC work is indeed challenging, a requires a significant amount of time to build the necessary expertise among the lab personnel. The Zoldan lab's initial work in this area is thorough and of high quality.

My independent search in late July, 2019 on ISI Web of Knowledge (which is likely imperfect) finds that Dr. Zoldan's research portfolio consists of 37 works, with a production of 1 (in 2015) to 6 (in 2017) works per year since starting at Texas in 2013. (I note Dr. Zoldan's CV details 34 published papers in her career through 2019.) Approximately 19 works have been published after Dr. Zoldan's appointment to Assistant Professor in 2013 – this is a very strong effort. Dr. Zoldan's citation statistics include 602 citations and an h-index of 10. These statistics (publications, citations, and h-index) are solid for a candidate being considered for promotion to Associate Professor. The quality of publications since Dr. Zoldan started at Texas is strong and well reflected in the high average number of citations per work (16.3).

As stated in her curriculum vitae, Dr. Zoldan's grant funding totals $408k as Principal Investigator. Funding comes from two sources: the American Heart Association and the Alliance for Regenerative Rehabilitation Research and Training. The former project was just completed, and the latter project is active through 2020. Overall, I believe Dr. Zoldan's ability to secure external funding is adequate. I imagine Dr. Zoldan is motivated to secure additional funding from the National Institutes of Health in the future, and this is evidence by a number of pending proposals. A search of NIH Project Reporter in late July, 2019 does not find any active NIH projects.

Dr Zoldan has mentored a significant number of student researchers and postdoctoral trainees To date 2 doctoral students have completed their studies in Dr Zoldan's laboratory and 1 doctoral student is currently in progress In addition 2 Masters students have completed their studies A variety of other undergraduate summer intern and high school students have worked in her laboratory For my university there is considerable emphasis placed on the graduation of at least 1 PhD student prior to promotion to Associate Professor Dr Zoldan has clearly achieved this expectation Overall it appears that Dr Zoldan has a very strong commitment to training

Unfortunately I could not find any description of the Dr Zoldan's course instruction (including a list of courses taught and the student evaluations for each course) at the University of Texas – perhaps this is my error I will therefore not comment on Dr Zoldan's impact on education I will note that I firmly believe that a strong department has a clear commitment from all members to educating undergraduate and graduate students in both the classroom and individual mentoring

Finally Dr Zoldan has been extremely active roles in service activities Dr Zoldan is an active member of the Biomedical Engineering Society (BMES) Society For Biomaterials (SFB) American Heart Association (AHA) Tissue Engineering and Regenerative Medicine International Society (TERMIS) International Society for Stem Cell Research (ISSCR) and the American Society for Engineering Education (ASEE) Dr Zoldan has already secured positions on a number of societal committees including the Finance Committee of SFB and the Scientific Advisory Board of TERMIS This is a fantastic effort for an Assistant Professor and again reflects Dr Zoldan's standing in the field In addition Dr Zoldan is active journal reviewer and grant proposal reviewer for many key publications and institutions respectively Finally Dr Zoldan has played an active role in many university school and department committees I believe that Dr Zoldan has clearly emphasized these service activities during her time at Texas and even more importantly has the potential for a long-term role in the scientific community as a result of this commitment

I am currently the Chair of the Fischell Department of Bioengineering and past Chair of the APT Committee for the A James Clark School of Engineering at the University of Maryland I believe that Dr Zoldan has demonstrated excellence in her research efforts and established a foundation for growth Dr Zoldan has published a number of works in the iPSC field - her work is of high quality Dr Zoldan's ability to secure external funding is likely a concern Mitigating strengths include her graduate student mentorship and service to the university and scientific communities Therefore it is on the basis of Dr Zoldan's scholarly work graduate mentorship and collegial service that I am happy to provide my support for her promotion to rank of Associate Professor in the Department of Biomedical Engineering at the University of Texas

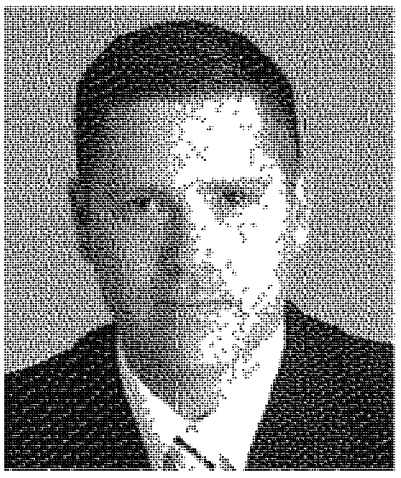
Best regards

John P Fisher
Fischell Family Distinguished Professor and Department Chair

UNIVERSITY OF MARYLAND

- Home
- Faculty Directory
- Fisher, John

Faculty Directory



Fisher, John

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EDUCATION

Ph.D., Rice University, 2003

Edit your faculty profile

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BC

Georgia Tech | Parker H. Petit Institute for Bioengineering and Bioscience

Shelly Sakiyama-Elbert, Ph D
Professor and Chair
Department of Biomedical Engineering
University of Texas, Austin

June 14, 2019

Dear Prof Sakiyama-Elbert

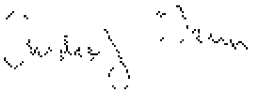
It is my pleasure to provide an evaluation of Dr Janeta Zoldan for her consideration for promotion to Associate Professor with tenure in the Department of Biomedical Engineering at the University of Texas at Austin I have known Dr Zoldan for several years, and because of our common research interests in biomaterials and regenerative medicine, I interact with her regularly at scientific conferences such as the annual meetings of the Society for Biomaterials and the Biomedical Engineering Society In my opinion, Dr Zoldan has made significant scholarly contributions to our research field, particularly as they relate to the interplay of human pluripotent stem cells and biomaterials in directing cardiovascular tissue formation Dr Zoldan has established a productive research program making impactful contributions in understanding how material physical cues direct human pluripotent stem cells into cardiac and vasculogenic lineages and engineering microenvironments that direct cardiovascular tissue formation Her excellent research contributions in these areas comprise several publications in well respected journals, including *Tissue Engineering Part A, ACS Nano,* and *Biomaterials Science* Dr Zoldan's work is characterized by integration of materials engineering and stem cell biology, careful and thorough analyses, and creativity One notable example is her recent *Tissue Engineering Part A* paper (Allen et al , 2019) In this elegant work, Dr Zoldan demonstrated that fiber alignment of biomaterial scaffolds could be exploited to direct human stem cell-derived cardiomyocyte synchronized beating This is a novel and important advance in the field as the investigators were able to decouple cardiomyocyte maturity from synchronized beating The generation of electromechanically coupled cardiac tissue with synchronized beating is a key step toward cell-based therapies for myocardial infarcts Dr Zoldan is now evaluating these tissue constructs in a model of myocardial infarct, which the logical next step in this work In another important contribution, Dr Zoldan evaluated the effects of collagen hydrogels (collagen density, presence of angiogenic growth factors, and proteolytic activity) on the ability of induced pluripotent stem cell-derived endothelial progenitors to self-assemble into vessel-like networks (Crosby et al , *Tissue Engineering Part A*, 2019) Dr Zoldan showed that the vasculogenic potential of these stem cell-derived endothelial progenitors is regulated by the matrix properties of collagen hydrogels and identified matrix conditions that resulted in the assembly of functional vascular structures This work serves as a foundation for basic studies of matrix and soluble factors that regulate vasculogenesis as well as therapeutic constructs for conditions requiring vascularization

Dr Zoldan has established an active interdisciplinary research program, as demonstrated by her publication and conference and departmental presentation records She has secured grants from the American Heart Association and the Alliance for Regenerative Rehabilitation Research and Training, and has several pending NIH, NSF, and American Heart Association proposals Dr Zoldan has made excellent contributions to undergraduate and graduate teaching and mentoring She has been recognized with a Scientist Development Grant research award from the American Heart Association and the 2017 Emerging Young Investigator Award from the Royal Society of Chemistry Dr Zoldan has also actively participated in internal and external service, including reviewing for scientific journals and funding bodies and

reviewing abstracts and chairing sessions at scientific meetings She is active in professional societies, and currently serves as Secretary-Treasurer of the Engineering Cells and their Microenvironments Special Interest Group of the Society for Biomaterials Overall, these levels of productivity and service are very good for someone at this professional stage

I have completed two-year terms on the Committee for Reappointment, Promotion, and Tenure (RPT) for Assistant-to-Associate Professors in my unit, in the College of Engineering, and on the Institute-level RPT Committee as well as currently serving in my departmental RPT committee I consider that Dr Zoldan has made significant contributions in research, teaching and service at a level on par to other candidates at a similar professional stage

Sincerely,



Andrés J García, Ph D , F B S E
Executive Director, Parker H Petit Institute for Bioengineering and Bioscience
Petit Director's Chair in Bioengineering and Bioscience
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Regents' Professor, George W. Woodruff School of Mechanical Engineering
Georgia Institute of Technology

Andrés J. García is the Executive Director of the Petit Institute for Bioengineering and Bioscience and Regents' Professor at the Georgia Institute of Technology. He earned a B.S. in Mechanical Engineering with Honors from Cornell University (1991), and M.S.E. (1992) and Ph.D. (1996) degrees in Bioengineering from the University of Pennsylvania. He completed a post-doctoral fellowship in cell and molecular biology at the School of Medicine of the University of Pennsylvania and then joined the faculty at Georgia Tech in 1998. Dr. García's research program integrates innovative engineering, materials science, and cell biology concepts and technologies to create cell-instructive biomaterials for regenerative medicine and generate new knowledge in mechanobiology. This cross-disciplinary effort has resulted in new biomaterial platforms that elicit targeted cellular responses and tissue repair in various biomedical applications, innovative technologies to study and exploit cell adhesive interactions, and new mechanistic insights into the interplay of mechanics and cell biology. Dr. García is recognized as an international leader in bioengineering as demonstrated by his prestigious scholarly publications (>250 publications, 85 h-index, >22,400 citations), invited presentations at conferences and research programs worldwide, research funding from NIH, NSF and private foundations, and membership on the editorial boards of leading biomaterial and regenerative medicine journals. In addition, his research has generated intellectual property and licensing agreements with start-up and multi-national companies. He has received several distinctions, including the NSF CAREER Award, Arthritis Investigator Award, Young Investigator Award from the Society for Biomaterials, Georgia Tech's Outstanding Interdisciplinary Activities Award, the Clemson Award for Basic Science from the Society for Biomaterials, and the International Award from the European Society for Biomaterials. He has been recognized as a top Latino educator by the Society of Hispanic Professional Engineers. He is an elected Fellow of Biomaterials Science and Engineering (by the International Union of Societies of Biomaterials Science and Engineering), Fellow of the American Association for the Advancement of Science, Fellow of the American Society of Mechanical Engineers, and Fellow of the American Institute for Medical and Biological Engineering. He served as President for the Society for Biomaterials in 2018-2019.

Significant publications

Johnson CT, Sok MCP, Martin KE, Kalkar PP, Caplin JD, Botchwey EA, García AJ. Lysostaphin and BMP-2 co-delivery reduces S. aureus infection and regenerates critical-sized segmental bone defects. *Sci Adv*. 2019, 5(5): eaaw1228.

Agarwal R, Johnson CT, Imhoff BR, Donlan RM, McCarty NM, García AJ. Inhaled bacteriophage-polymeric particles ameliorate acute lung infections. *Nat Biomed Eng*. 2018, 2: 841-49.

Headen DM, Woodward KB, Coronel MM, Shrestha P, Weaver JD, Zhao H, Tan M, Hunckler MD, Bowen WS, Johnson CT, Shea L, Yolcu ES, García AJ, Shirwan H. Local immunomodulation with Fas ligand-engineered biomaterials achieves allogeneic islet graft acceptance. *Nat Mater*. 2018, 17: 732-739.

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Lee TT, García JR, Paez JI, Singh A, Phelps EA, Weis S, Shafiq Z, Shekaran A, del Campo A, García AJ Light-triggered in vivo activation of adhesive peptides regulates cell adhesion, inflammation and vascularization of biomaterials *Nat Mater* 2015, 14 352-60

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Headen DM, Aubry G, Lu H, García AJ Microfluidic-based generation of size-controlled, biofunctionalized synthetic polymer microgels for cell encapsulation *Adv Mater* 2014, 26 3003-8

Dumbauld DW, Lee TT, Singh A, Scrimgeour J, Gersbach CA, Zamir EA, Fu J, Chen CS, Curtis JE, Craig SW, García AJ How vinculin regulates force transmission *Proc Natl Acad Sci USA* 2013, 110 9788-93

Singh A, Suri S, Lee T, Chilton JM, Cooke MT, Chen W, Fu J, Stice SL, Lu H, McDevitt TC, García AJ Adhesion strength-based, label-free isolation of human pluripotent stem cells *Nat Methods* 2013, 10 438-44

Coyer SR, Singh A, Dumbauld DW, Calderwood DA, Craig SW, Delamarche E, García AJ Nanopatterning reveals an ECM area threshold for focal adhesion assembly and force transmission that is regulated by integrin activation and cytoskeleton tension *J Cell Sci* 2012, 125 5110-23

Phelps EA, Enemchukwu NO, Fiore VF, Sy JC, Murthy N, Sulchek TA, Barker TH, García AJ Maleimide cross-linked bioactive PEG hydrogel exhibits improved reaction kinetics and cross-linking for cell encapsulation and in situ delivery *Adv Mater* 2012, 24 64-70

Petrie TA, Raynor JE, Dumbauld DW, Lee TT, Jagtap S, Templeman KL, Collard DM, García AJ Multivalent integrin-specific ligands enhance tissue healing and biomaterial integration *Sci Transl Med* 2010, 2(45) 45ra60

Phelps EA, Landázuri N, Thulé PM, Taylor WR, García AJ Bioartificial matrices for therapeutic vascularization *Proc Natl Acad Sci USA* 2010, 107 3323-8

Phillips JE, Burns KL, Le Doux JM, Guldberg RE, García AJ Engineering graded tissue interfaces *Proc Natl Acad Sci USA* 2008, 105 12170-5

Gallant ND, Michael KE, García AJ Cell adhesion strengthening: contributions of adhesive area, integrin binding, and focal adhesion assembly *Mol Biol Cell* 2005, 16 4329-40

Keselowsky BG, Collard DM, García AJ Integrin binding specificity regulates biomaterial surface chemistry effects on cell differentiation *Proc Natl Acad Sci USA* 2005, 102 5953-7

Keselowsky BG, Collard DM, García AJ Surface chemistry modulates fibronectin conformation and directs integrin binding and specificity to control cell adhesion *J Biomed Mater Res A* 2003, 66 247-59

Reyes CD, García AJ Engineering integrin-specific surfaces with a triple-helical collagen-mimetic peptide *J Biomed Mater Res A* 2003, 65 511-23

JOHNS HOPKINS
INSTITUTE for
NANOBIOTECHNOLOGY

Candidate

Sharon Gerecht, PhD

July 22, 2019

Dear Dr Sakiyama-Elbert,

In response to your request for my evaluation of Dr Janet Zoldan whom you are considering for tenure promotion to the rank of Associate Professor in your department, I write the following detailed evaluation I am familiar with Janet's work throughout her career and we have met several times including during my visit to your department and in several conferences

Janet's research and my own interests are overlapping, and so I hope that my comments on her accomplishments are helpful to you in your deliberations Overall, Janet is an accomplished researcher whose work is innovative and addresses important questions Her research focuses on the use of human iPSCs to model and explore the key processes of cardiac tissue formation Janet's laboratory studies how different aspects of the microenvironment regulate cell differentiation towards the formation of a functioning cardiovascular tissue I find this line of research interesting and Janet is contributing to its advancements For example, in one study, her group demonstrated the use of the thermosensitive polymer poly(N-isopropyl acrylamide) (PNIPAAm) to generate an align cell sheet The team electrospun PNIPAAm blended with and poly(caprolactone) (PCL) and aligned the fibers to generate uniform surfaces Cells cultured on these surfaces aligned and were able to detach by incubation with cold medium, generating cell sheets better recapitulate anisotropic architecture with the potential to achieve proper tissue function This work has been published in the Journal of Biomaterials Science in 2017 In a more recent work, the team has used the aligned fibrous substrates to evaluated stem cell-derived cardiomyocyte alignment, contractile displacement, and calcium transient synchronicity Interestingly, they observed gradient- and threshold-based differences in cardiomyocyte alignment and function, concluding that biomaterial anisotropy impact on differentiating cardiomyocyte structure and function is temporally dependent This work was recently published in Tissue Engineering Part A in 2019

Janet's curriculum vitae lists are impressive 35 peer-reviewed journal publications, with 8 as first author and 13 as corresponding author, and 2 book chapters Her H index is 13, with 930+ citations, which I expect to increase with several publications coming out in the near future She has delivered 20 invited lectures and had her research accepted for 46 conference presentations All these demonstrate the interest and contribution of Janet's work to the development and ment of the field stem cell engineering

Janet has been recognized with multiple awards and recognition, including the prestigious *2017 Emerging Young Investigator from Royal Society of Chemistry*, and the prestigious *Scientist Development Grant from the American Heart Association* She currently sits on the Biolife4D Scientific Advisory Board and is a member in numerous Professional and Honorary Societies, such as SFB and BMES, where she has served on 10 committees and 9 grant review committees, including NASA, NIH, and the NSF Janet's work has been highlighted in various publications and other media, including the special issue Overall, she has been awarded 2 grants, with another 5 pending This is noteworthy accomplishment given the early stage of Janet's career and the current highly competitive funding era

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PROFESSOR, WHITING SCHOOL OF ENGINEERING
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Janet's dossier lists many mentoring activities She has graduated two doctoral students, two MS students and 17 undergraduate students, and presently advises one doctoral student and five undergraduates Her students have presented at domestic conferences and won awards, including two National Science Foundation Graduate Research Fellowships and two NIH T32 Graduate Training Fellowships Janet has been teaching the Engineering Biomaterials course, designed for BME students only She continually participates in faculty/student events at both the University level and in the Austin public school system Janet's commitment to mentorship and education is impressive

Janet's service at the departmental and university levels is excellent She has served on 8 departmental committees including the Undergraduate Curriculum Committee Janet also founded the 'Doctor is in the House' seminar series in 2013, which is widely popular She has reviewed applications on behalf of both the Cockrell School of Engineering for NIH and internal awards, and for internal University programs Janet is currently a member of the Advisory Committee for the University's Mouse Genetic Engineering Facility She has served on more than 22 thesis committees and 25 PhD qualifying committees

In summary, Janet's work is scholarly and at the interface of stem cells and engineering She has contributed to the advancement of her field and to the educational mission of the University of Texts at Austin I fully support Janet's promotion to tenured Associate Professor and believe that she will continue to grow and excel as a scholar Your department and university will gain over the coming years by offering Janet this promotion

Sincerely,

Sharon Gerecht

SHARON GERECHT

Professor, Department of Chemical and Biomolecular Engineering, Materials Science and Engineering, Oncology, Biomedical Engineering, Oncology, Johns Hopkins University
(410) 516-2846, gerecht@jhu edu

(a) PROFESSIONAL PREPARATION

Technion - Israel Institute of Technology, Biology	B A	1994
Tel Aviv University, Medical Sciences	M Sc	1999
Technion - Israel Institute of Technology, Biotechnology	Ph D	2004

(b) APPOINTMENTS

Director	Institute for NanoBioTechnology	2017-Present
Professor	Johns Hopkins University	2016-Present
Associate Director	Institute for NanoBioTechnology	2016- 2017
Associate Professor	Johns Hopkins University	2013- 2016
Assistant Professor	Johns Hopkins University	2007- 2013
Postdoctoral Fellow	MIT	2004-2007
Postdoctoral Researcher	Technion	2004

(c) PRODUCTS

135 peer-reviewed publications, seven previews & opinion, 25 book chapters, one book and 22 patents from which 4 are licensed Total citations for publications >8500, h-index 48 (Google Scholar, 03/2019)

Publications Related to the Proposed Activity:

1 Sun G, Zhang X, Shen Y-I, Sebastian R, Fox-Talbot K, Reinblatt M, Steenbergen C, Harmon J, **Gerecht S** Dextran hydrogel scaffolds enhance angiogenic response and promote complete skin regeneration during burn wound healing *Proc Natl Acad Sci U S A* 2011, 108 20976-20981

2 Hanjaya-Putra D, Bose V, Shen Y-I, Yee J, Khetan S, Fox-Talbot K, Steenbergen C, Burdick JA, **Gerecht S** Controlled activation of morphogenesis to generate a functional human microvasculature in a synthetic matrix *Blood* 2011,118 804-815

3 Park KM, **Gerecht S.** Hypoxia-inducible hydrogels *Nat Commun.* 2014, 5 4075 PMID 24909742

4 Shen Y-I, Song H-HG, Papa A, Burke J, Volk SW, Gerecht S Acellular hydrogels for regenerative burn wound healing translation from a porcine model *J Invest Dermatol.* 2015 135 2519-2529

5 Lewis DM*, Blatchley M*, Park KM, Gerecht S O_2-controllable hydrogels to study cellular responses to 3D hypoxic gradients *Nat Protoc.* 2017, 12 1620-163

Other Significant Publications:

6 Kusuma S, Shen Y-I, Hanjaya-Putra D, Mali P, Cheng L, **Gerecht S** Self-Organized Vascular Networks from Human Pluripotent Stem Cells in a Synthetic Matrix *Proc Natl Acad Sci USA* 2013, 110 12601-12606

7 Lewis D, Park KM, Tang V, Xu Y, Pak K, Eisinger-Mathason T S K, Simon CM, Gerecht S

CONFIDENTIAL UT Austin_0024896

Intratumoral oxygen gradients mediate sarcoma cell invasion *Proc Natl Acad Sci U S A. 2016;* 113 9292-9297

8 Smith Q, Chan XY, Carmo AM, Trempell M, Saunders M, Gerecht S Differentiation of Human Pluripotent Stem Cells on Compliant Substrates Leads to Robust and Reproducible Endothelial Fate *Sci. Adv* 2017, 3 e1602883

9 Smith Q*, Rochman N*, Carmo AM, Vig D, Chan XY, Sun S^, Gerecht S^ Cytoskeletal Tension Regulates Mesodermal Spatial Organization and Subsequent Vascular Fate *Proc Natl Acad Sci USA* 2018, 115 8167-8172

10 Blatchley MB, Hall F, Wang S, Pruitt H, Gerecht S Hypoxia and matrix viscoelasticity sequentially regulate endothelial progenitor cluster-based vasculogenesis *Sci Adv.* In press

(d) AWARDS AND HONORS

1998-1999	Tel Aviv University, Sackler Faculty of Medicine, Graduate School, Merit Award
2001-2003	Technion - Israel Institute of Technology, Graduate School, Merit Award
2004	European Science Foundation, Cellular & Molecular Basis of Regeneration, Euresco Conferences Award
2005-2007	Juvenile Diabetes Research Foundation (JDRF), Postdoctoral Fellowship Award
2006	Engineering Conferences International, The 10th conference on Cell Culture Engineering, Conference Award
2007	Keystone Symposia Scholarship, Stem Cell Interactions with their Microenvironmental Niche
2008	Maryland Academy of Sciences Outstanding Young Engineer Award, Allan C Davis Medal
2008-2012	American Heart Association (AHA) National Scientist Development Award
2009-2011	Basil O'Connor Starter Scholar Research Award, the March of Dimes Foundation
2009	North America Vascular Biology Organization (NAVBO) Junior Investigator Award
2011	U S New Investigators Travel Award, International Society on Thrombosis & Haemostasis (ISTH), Kyoto, Japan (declined)
2011-2016	NSF CAREER award
2014-2017	W W Smith Charitable Trust Heart Award
2015-2019	American Heart Association (AHA) National Established Investigator Award
2015-Present	Inaugural Kent Gordon Croft Investment Management Faculty Scholar
2015	JHU Inaugural President's Frontier Award
2016	Elected fellow of the American Institute for Medical and Biological Engineering (AIMBE)
2017	Patrick C Walsh Prostate Cancer Research Fund

(e)) SYNERGISTIC ACTIVITIES

- **Technology impact:** Out of 12 patents filed while at JHU, 4 were licensed to Gemstone Therapeutics, LLC, a start up established by Gamma 3 investors to commercialize technology developed in the Gerecht lab Gemstone Therapeutics, LLC raised >$5M First in human predicted in mid 2019
- **Panelist (selected out of > 20 domestic and international agencies):** National Institute of Health NIGMS, NHLBI, NIDDK, NCI, DoD, National Science Foundation- DMR, BME,

American Heart Association, Human Frontier Science Program, California Institute for Regenerative Medicine, New York State Stem Cell Board NYSTEM Program, Armed forces regenerative medicine II

- **Scientific Board:** CIPF-Valencia Biomedical Research Foundation, Spain
- **Editorial services:** *Editorial Board:* Tissue Engineering (Parts A, B and C, 2014-), Scientific Reports (2014-), Journal of Biological Engineering (2016-), Current Opinion in Chemical Engineering (2017-), Journal of Clinical Investigation (JCI) (2017-2018) *Editor:* PLoS ONE (2013-), Stem Cell Reviews and Reports (SCRR, 2016-), Current Opinion in Chemical Engineering (2016-2017) *Consulting Editor:* Journal of Clinical Investigation (JCI) (2018-)
- **Symposium organization:** Session chair at 1st International Conference on Stem Cell Engineering (ICSCE), Society for Biological Engineering (SBE), 2008, 2nd ICSCE, SBE, 2010, The Experimental Biology, 2011, 3rd ICSCE, SBE, 2012 , 9th World Biomaterials Congress (WBC), 2012 Organizing committee of TERMIS-AM 2013, Biomedical Engineering Society (BMES) Annual Meeting, 2013, Aegean Conference on Tissue Engineering, 2014, 4th ICSCE, SBE, 2014 Co-Chair 5th ICSCE, SBE, 2016
- **Review for Journals (selected out of > 50 journals):** Biomaterials, Advanced Functional Materials, Advanced Health Materials, Advanced Materials, Small, Lab Chip, Stem Cells, Stem Cell Trans Med, Cell stem Cell, Proceedings of the National Academy Of Sciences, Arthrosclerosis, Thrombosis, and Vascular Biology, European Heart Journal, Blood, Circulation Research, Circulation, Nature Protocols, Nature Methods, Nature Materials, Science Advances
- **Student mentorship:** 10 PhD graduated and 10 PhD student currently in training, 10 MSc students graduates, one currently in training, mentored over 40 undergraduate students Active participant in several training programs including NSF-IRES, NSF-REU, NIH-T32

BC

David L. Kaplan

July 21, 2019

Subject: Letter of Recommendation -- Janet Zoldan, Ph.D.

Shelly Sakiyama-Elbert, Ph D
Department Chair and Professor
Fletcher Stuckey Pratt Chair in Engineering
University of Texas at Austin
Austin, Texas 78712-0238

Dear Professor Sakiyama-Elbert

I am pleased to offer a positive letter of support for Janet Zoldan's promotion from Assistant Professor to Associate Professor with tenure in the Department of Biomedical Engineering at the University of Texas at Austin I have known Prof Zoldan only briefly, during her time at MIT while she was in the Langer lab, and when she recently visited our Department to present a seminar (The role of biophysical and biochemical cues in engineering stem cell microenvironments) in the spring of 2019 Thus, my input for this letter is based on her research presented at the seminar, the reading of some of her peer reviewed publications, as well as a review of the documentation provided as part of the preparation of this letter Based this review of her scholarly activities and related academic endeavors, I provide a positive letter of support for her promotion with tenure

Prof Zoldan joined the Department as an assistant professor in 2013, after her various career steps at MIT as post-doctoral fellow and research associate from 2007 until joining UT Austin She has her Ph D in materials engineering from Technion, Israel Institute of Technology and her B Sc in chemistry from Hebrew University I find Professor Zoldan's scientific work to be interesting, meaningful and creative The research in her laboratory has focused on the role of interfaces between materials science and stem cell bioengineering, with a focus on iPSCs 3D matrix designs with signal control are a key focus, where the emphasis is on the role of physical modulation of iPSC differentiation into cardiovascular lineages towards cardiovascular tissue formation Of particular note is her work on electrospun poly(N-isopropylacrylamide)/poly(caprolactone) fibers for anisotropic cell sheets, as an important option to modulate control of cell organization and utility for a range of different studies Her studies have spanned fundamental to translational goals, including disease mechanisms, drug testing and tissue regeneration in vivo These studies are highly significant, as we remain very much in the dark on how physical cues, in synergy with biochemical factors, orchestrate cell fate and function, with the cardiac organ as a particularly challenging focus due to the complexity of the system Thus, her research is highly significant due to the clinical needs in this arena, combined with the broader fundamental base of understanding to be considered towards many cell and tissue types Thus, Prof Zoldan's research focus should be sustainable into the future as a suitable area for inquiry, funding and to attract students to her lab

She has been recognized with a number of awards during her time at UT Austin, including election as secretary-treasurer for a special interest group for the Society of Biomaterials in 2019, a member of the Scientific Advisory Board for the Tissue Engineering and Regenerative Medicine International Society World Congress in 2019, and selected as an Emerging Young Investigator by the Royal Society of Chemistry Journal of Biomaterials Science, in 2017, among other recognition related to presentations, reviews and related activities

In terms of scholarship, her peer reviewed publication record is solid, with ~16 publications and 2 patents since starting at U T Austin For those papers where she is senior author, this includes many papers in key journals for her field of study, such as *Biochemistry, Stem Cell Research, Cell Stem Cell* and *Tissue Engineering Part A,* among others In terms of grants, she currently has two grants as PI, one from the American Heart Association (which may have ended now) and one from the Alliance for Regenerative Rehabilitation Research and Training The AHA grant is focused on ischemia therapy related to control of the differentiation of iPSCs into vascular networks and the AR3T is focused on promoting neurovascularization The AHA program is particularly noteworthy as a Scientist Development Grant There are no NSF or NIH grants funded to date, although there are numerous fellowships awarded to her students via these federal agencies The overall grant support is a bit thin, but with a number of NIH proposals in review it would appear that Prof Zoldan is very active in continuing to pursue additional funding for her group

In terms of mentorship, Prof Zoldan has had two Ph D students complete their studies in her lab and both have gone on to career-progressive positions, one in industry and one as a postdoctoral fellow These are solid signs of positive mentorship Similarly, two M S students have completed their studies and are now in professional positions She has also had a large group of undergraduate students conduct research in her lab A number of her students, graduate and undergraduate, have also earned various fellowship trainee awards for their research and programs, including from the NSF and NIH Prof Zoldan has been actively invited to present seminars at both academic sites and professional meetings, reflective of the respect for her scientific contributions She has also provided input and support for a number of Department- and University-related committees/functions to support her engagement in local professional circles Of particular note is her active engagement and commitment to women in science and engineering, as well as her strong support for undergraduate student research and broader community outreach There was no data provided on teaching, thus, I am unable to comment on this aspect of her contributions

In conclusion, I am supportive of the promotion of Prof Zoldan to Associate professor with tenure She has demonstrated solid scholarship and scientific leadership while establishing a productive and significant laboratory focus that should be sustainable into the future She seems to be on a positive career trajectory and with some additional grant support her laboratory should be a major contributor into the future Her mentorship seems strong and her support for women in engineering, undergraduate student research and community activities, are significant

Please do not hesitate to let me know if you would like additional input

David L Kaplan
Stern Family Endowed Professor of Bioengineering
Professor & Chair, Department of Biomedical Engineering
Distinguished University Professor
Tufts University
Director, NIH P41 Resource Center on Tissue Engineering
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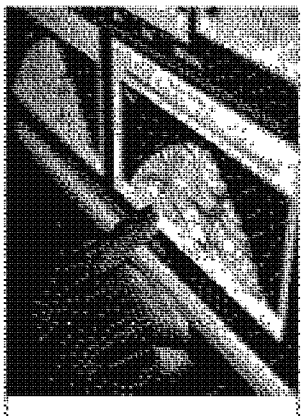


People:

Faculty

Part-time Lecturer

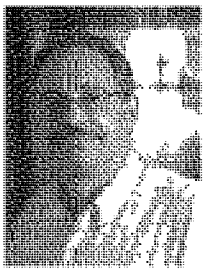
Emeritus Faculty

Staff

People

David Kaplan

Stern Family Professor of Engineering
Distinguished Professor
Professor and Chair, Department of Biomedical Engineering
Professor, Department of Chemical Engineering
Director, Bioengineering and Biotechnology Center



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Email

- Publications
- Research Group website
- The Kaplan Lab website
- Director of Tufts (interdisciplinary center)

Education

1975 B.S., SUNY, Albany
1978 Ph D , Syracuse University and SUNY Syracuse

Professional Experience

- 2012-pres Chair, NIH Study Section – BMBI - Biomaterials and Biointerfaces
- 2006-pres Stern Family Endowed Professor of Bioengineering – Tufts University
- 2002-pres Professor & Chair, Department of Biomedical Engineering
- 2006-pres Professor – Tufts University School of Medicine, Sackler School of Graduate Biomedical Sci Program in Cell, Molecular, Developmental Biology
- 2005-pres Professor, Secondary Appointment – Tufts University School of Dental Medicine
- 2004-pres Director, NIH P41 Tissue Engineering Resource Center
- 2000-pres Professor, Secondary Appointment – Dept Chemistry, Tufts University

Honors and Awards

- 2011 Chair Professor, Soochow University, China
- 2009 Elected Tissue Engineering Society (TERMIS) Member-at-Large North America
- 2007 Society for Biomaterials, Clemson Award for Literature
- 2007 Massachusetts Columbus Quincentennial Award
- 2006 Henry and Madeline Fischer Faculty Award – Tufts University
- 2003 Elected Fellow, American Institute of Medical and Biological Engineering
- 2000 Appointed Associate Editor, ACS Biomacromolecules

Research Interests

The Kaplan lab research focus is on biopolymer engineering to understand structure-function relationships, with emphasis on studies related to self-assembly, biomaterials engineering, tissue engineering and regenerative medicine. The studies include a variety of structural proteins, including collagens, elastins, resilins and silks. In addition, the lab has pioneered the study of silk-based biomaterials in regenerative medicine, starting from fundamental studies of the biochemistry, molecular biology and biophysical features of this novel class of fibrous proteins to their impact on stem cell functions and complex tissue formation. The result has been the emergence of silk as a new option in the degradable polymer field with excellent biocompatibility, new fundamental understanding of control of water to regulate structure and properties, and new tissue-specific outcomes with silk as scaffolding in gel, fiber, film or sponge formats. Studies are also focused on tissue engineering and regenerative medicine with the use of complex 3D tissue co-culture systems to establish and study human tissues in the laboratory and in animal systems. These systems are also used to study diseases associated with brain, intestine, kidney, obesity, diabetes and cancers, including for therapeutic screening. Interfaces with optical imaging tools are also exploited.

Biography

David Kaplan holds an Endowed Chair, the Stern Family Professor of Engineering, at Tufts University. He is Professor & Chair of the Department of Biomedical Engineering and also holds faculty appointments in the School of Medicine, the School of Dental Medicine, Department of Chemistry and the Department of Chemical and Biological Engineering. His research focus is on biopolymer engineering to understand structure-function relationships, with emphasis on studies related to self-assembly, biomaterials engineering and functional tissue engineering/regenerative medicine. He has published over 600 peer reviewed papers and edited eight books. He directs the NIH P41 Tissue Engineering Resource Center (TERC) that involves Tufts University and Columbia University. He serves of the editorial boards of numerous journals and is Associate Editor for the ACS journal Biomacromolecules. He has received a number of awards for teaching, was Elected Fellow American Institute of Medical and Biological Engineering and received the Columbus Discovery Medal and Society for Biomaterials Clemson Award for contributions to the literature.

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Candidate

RICE

ANTONIOS G. MIKOS
Louis Calder Professor of Bioengineering and Chemical and Biomolecular Engineering
Director of Center for Excellence in Tissue Engineering

July 28, 2019

Shelly Sakiyama-Elbert, Ph.D.
Department Chair and Professor
Fletcher Stuckey Pratt Chair in Engineering
The University of Texas at Austin
Department of Biomedical Engineering
107 W. Dean Keeton St.
Austin, Texas 78712-0238

Dear Shelly,

It is with great pleasure that I write this letter to offer my strong support to Dr. Janet Zoldan, who is being considered for tenure and advancement in rank to the position of Associate Professor at the University of Texas at Austin. Tenure and advancement in rank will reflect recognition of Janet's excellent contributions in the application of engineering principles and materials science toward the design of novel polymeric materials to better understand the interplay of physical cues, stem cell differentiation, and tissue formation, especially in the focused area of cardiovascular tissue engineering.

It has been a pleasure to follow the development of Janet's research program through her presentations at various conferences and publications in leading research journals in her field. Indeed, Janet has authored thirty-five research manuscripts in journals of the highest quality and impact in her area, including *Biomaterials Science*, *Regenerative Biomaterials*, and *Tissue Engineering Part A*. The impact of Janet's publications in her various areas of research is evidenced by the number of citations her manuscripts have received to-date (936 citations; *h*-index of 13). Her publication record and the associated metrics are excellent when compared to those of her peers at the same stages in their professional development, and clearly demonstrate her ability to foster active collaborations with colleagues at the University of Texas at Austin and other institutions. The quality and integrity of Janet's research effort coupled with her promise for continued success resulted in her funding as Principal Investigator on two projects sponsored by the American Heart Association and the Alliance for Regenerative Rehabilitation Research and Training. There can be no doubt that Janet's research will continue to be of the highest caliber and impact. An interesting and outstanding aspect of Janet's work is her consistent focus on deciphering the role of physical cues in lineage progression and tissue development and growth with enormous implications in tissue engineering research.

As a complement to her research prowess, Janet excels as a mentor and educator in the classroom and laboratory. In just under six years as faculty at the University of Texas at Austin, Janet has mentored two postdoctoral fellows, three doctoral students, one masters students, and twenty-one undergraduate students. Janet was recognized for the exceptional quality and lasting impact of her mentoring with her selection by the *Biomaterials Science* of the Royal Society of Chemistry as Emerging Young Investigator in 2017. Further, Janet capably balances her time to include professional service, having served as a referee for grant proposals and research manuscripts.

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In summary, Janet's research contributions have provided important and lasting insight into the role of the microenvironment in tissue formation and regeneration, especially in the area of cardiovascular tissue engineering. She masterfully balances excellence in research with mentorship, teaching and professional service, thereby increasing the depth of the impact of her work. There can be no doubt that her continued productivity in biomedical engineering research will focus creatively on issues of central importance. Thus, I give her my full recommendation and support.

Sincerely,

Antonios G. Mikos, NAE, NAM

RICE Bioengineering

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DEPARTMENT OF BIOENGINEERING

Home

Welcome

Graduate Program

Undergraduate Program

People

Research Focus Areas

BioScience Research Collaborative (BRC)

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Available Positions

Useful Links

Bioengineering Faculty

Scholarly Interest Reports

Scopus

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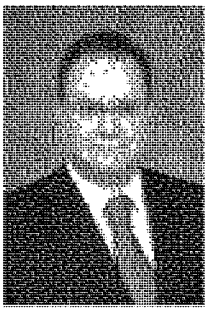
Antonios G. Mikos



Louis Calder Professor of Bioengineering, Chemical and Biomolecular Engineering
Director, Center for Engineering Complex Tissues
Director, Center for Excellence in Tissue Engineering
Director, J.W. Cox Laboratory for Biomedical Engineering

Mikos Research Group

Postdoctoral Fellow Massachusetts Institute of Technology, Harvard Medical School (1990-1991)
Ph.D., Chemical Engineering, Purdue University (1990)
M.S.Ch.E., Chemical Engineering, Purdue University (1986)
Dipl.Ch.E., Chemical Engineering, Aristotle University of Thessaloniki, Greece (1983)

Bio Sketch

Antonios G. Mikos is the Louis Calder Professor of Bioengineering and Chemical and Biomolecular Engineering at Rice University. He is the Director of the National Institutes of Health Center for Engineering Complex Tissues, the Director of the Center for Excellence in Tissue Engineering, and the Director of the J.W. Cox Laboratory for Biomedical Engineering at Rice University. He received his Dipl. Eng. (1983) from the Aristotle University of Thessaloniki, Greece, and his Ph.D. (1990) in chemical engineering from Purdue University. He was a postdoctoral researcher at the Massachusetts Institute of Technology and the Harvard Medical School before joining the Rice faculty in 1992 as an assistant professor.

Mikos' research focuses on the synthesis, processing, and evaluation of new biomaterials for use as scaffolds for tissue engineering, as carriers for controlled drug delivery, and as non-viral vectors for gene therapy. His work has led to the development of novel orthopaedic, dental, cardiovascular, neurologic, and ophthalmologic biomaterials. He is the author of over 650 publications and 28 patents. He is the editor of 16 books and the author of one textbook (Biomaterials: The Intersection of Biology and Materials Science, Pearson Prentice Hall, 2008). Mikos is among the top 1 percent most cited researchers in his field. His work has been cited over 62,500 times and he has an h-index of 128.

Mikos is a Member of the National Academy of Engineering, a Member of the National Academy of Medicine, a Member of the Academy of Medicine, Engineering and Science of Texas, and a Member of the Academy of Athens. He is a Founding Fellow of the Tissue Engineering and Regenerative Medicine International Society, a Fellow of the American Association for the Advancement of Science, a Fellow of the American Institute of Chemical Engineers, a Fellow of the American Institute for Medical and Biological Engineering, a Fellow of the Biomedical Engineering Society, a Fellow of the Controlled Release Society, a Fellow of the International Union of Societies for Biomaterials Science and Engineering, and a Fellow of the National Academy of Inventors.

Mikos has been recognized by various awards including the *Lifetime Achievement Award* of the Tissue Engineering and Regenerative Medicine International Society-Americas, the *Founders Award* and the *Clemson Award for Contributions to the Literature* of the Society For Biomaterials, the *Robert A. Pritzker Distinguished Lecturer Award* of the Biomedical Engineering Society, the *Alpha Chi Sigma Award for Chemical Engineering Research* and the *Food, Pharmaceutical and Bioengineering Award in Chemical Engineering* of the American Institute of Chemical Engineers, the *Merrem/Wiley Distinguished Author Award* and the *Chemstations Lectureship Award* of the American Society for Engineering Education, the *Edith and Peter O'Donnell Award in Engineering* of the Academy of Medicine, Engineering and Science of Texas, the *Marshall R. Urist Award for Excellence in Tissue Regeneration Research* of the Orthopaedic Research Society, the *Distinguished Scientist Award - Isaac Schour Memorial Award* of the International Association for Dental Research, and the *Distinguished Engineering Alumnus Award* of Purdue University.

Mikos has mentored 65 graduate students on their way to completing their doctoral studies, as well as 37 postdoctoral fellows, 22 of whom remain in academia at institutions including Georgia Tech, Hanyang University, Mayo Clinic, Texas A&M University, Tulane University, University of Maryland, University of New Mexico, University of Oklahoma, University of Texas at Austin, and Virginia Tech among others. He is organizer of the continuing education course *Advances in Tissue Engineering* offered annually at Rice University since 1999.

Mikos is a founding editor and editor-in-chief of the journals *Tissue Engineering Part A*, *Tissue Engineering Part B: Reviews*, and *Tissue Engineering Part C: Methods* and a member of the editorial boards of the journals *Advanced Drug Delivery Reviews*, *Journal of Biomaterials Science Polymer Edition*, *Journal of Biomedical Materials Research (Part A and B)*, and *Journal of Controlled Release*. He is Past-President of the Tissue Engineering and Regenerative Medicine International Society-Americas and the Society For Biomaterials.

Current projects in the Mikos Research Group include:

- Investigating bone regeneration and repair using a biodegradable polymer scaffold, either by inducing post-implantation bone tissue growth or by seeding the scaffold with bone cells prior to implantation,
- Developing new rapid prototyping processing methods for manufacturing 3-D biodegradable polymer scaffolds of anatomical shapes with precise architecture,
- Fabricating injectable, in situ polymerizable, biodegradable composite scaffolds as carriers for bone and cartilage cells to improve the quality of tissue formed in localized areas after injury,
- Developing new flow perfusion bioreactors and examining the effects of mechanical forces and flow on three-dimensional cultures of bone cells and the production of extracellular matrix,
- Synthesizing new biomimetic materials that exhibit the mechanical responsiveness and biochemical processing capabilities of living cells and tissues,
- Investigating the controlled release of growth factors from polymeric scaffolds to induce regeneration cascades in bone and cartilage, and
- Fabricating novel nanocomposites using nanoparticles and single-walled carbon nanotubes as reinforcing agents to improve mechanical properties of scaffolds for bone tissue engineering.

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July 23, 2019

Shelly Sakiyama-Elbert, Ph.D.
Department Chair and Professor
Fletcher Stuckey Pratt Chair in Engineering

Dear Professor Sakiyama-Elbert,

I am writing in response to your request for an evaluation of Professor Janeta Zoldan as part of her review for promotion to the rank of Associate Professor in the Department of Biomedical Engineering, University of Texas at Austin, with tenure. I have known Professor Zoldan for approximately three years due to our shared interest in cardiac tissue engineering and corresponding engagement at conferences and with grant review.

According to the numbers, Professor Zoldan is very good. I will begin with publications wherein I count 20 peer-reviewed works while in rank with 11 as corresponding author, 4 of which are reviews of the literature. This is an impressive number and is complemented by the strong reputation of the journals in which she publishes. At this early stage impact cannot be easily gauged by numbers of citations, but instead by recognition of colleagues. I believe one of her most substantive works to date was published in *Tissue Engineering Part A* wherein she studies the impact of extracellular matrix protein density, angiogenic factors, and the relative abundance of remodeling enzymes on vasculogenesis. Systematic evaluation of these stimuli to promote the generation of larger scale and thicker engineered cardiac tissue is critical to the field. This is a new publication and so has not yet received attention, but will be a valuable resource in the future. For these efforts and those related to cardiomyocyte differentiation and maturation, Professor Zoldan has been invited to speak at national conferences (most recently Bioengineering and Nanotechnology, 2019) and to contribute an article commentary on a recent advance in cardiac tissue engineering (Cell Stem Cell, 2019). In addition, she has just begun to investigate the use of varied anisotropic materials to guide organization and enhance maturation of induced pluripotent stem cell derived cardiomyocytes. Professor Zoldan has the training and insight to transform early descriptive studies in this field into works that delve into the mechanism of action. The field almost completely lacks insight and detail related to the intracellular signaling events that transpire when a stem cell or stem cell-derived cell interacts with a synthetic or natural matrix. Professor Zoldan has begun to address this void and will continue in years to come to elevate this critical area of study.

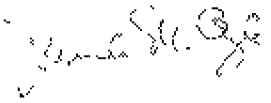
To support this important work, Professor Zoldan has secured an American Heart Association award and an Alliance for Regenerative Rehabilitation Research Training award. In addition, she has several more proposals under evaluation. Based on the titles of the funded and pending proposals, it appears Professor Zoldan is pursuing a multifaceted approach to vascularization of engineered tissues and with ischemic disease. She has been and will continue to develop tools to coax blood vessels to populate regions of native and engineered tissue in need of nutrients. I will be interested to continue to follow the work as it shifts from tube formation in ischemic structures to fully perfused vessels structurally linked to the host or external nutrient supply. I am not sure if there are completed proposals not listed on her CV. If not, the amount of funding for her level is less than average, but should be considered in the context of incredible competition in the cardiovascular

space. In my view Professor Zoldan is working to make connections in the field to bolster collaborations and thereby improve her probability of funding. I have seen effort on this front. In the last year she has given several invited presentations at universities across the country. In addition, I have been impressed with her insightful commentary and contribution at CDD study section where I am a standing member and I suspect she is close to a breakthrough in funding of larger scale grants.

As for service in her field, it appears Professor Zoldan has contributed in meaningful ways already. She is quite active in BMES (track chair), SFB (secretary treasurer for a SIG) and TERMIS, (scientific advisory board). It is clear that she has a vested interest in supporting the progress of the field in not only driving activities of our main societies, but also in guiding the scientific content and in identifying areas to improve and grow stronger.

In sum, Professor Zoldan has succeeded in establishing a laboratory from which high caliber works and competent trainees (2 PhD graduates thus far) have emerged. She has identified the significant challenge of vascularization as the centerpiece for her lab and has laid the groundwork for future progress in this area. She has communicated strong and interesting results by way of seven peer-reviewed original studies, which is on par with others in her cohort at research-intensive universities. She is working hard to bolster her funding record with multiple proposal submissions and with networks and collaborations beyond her home institute. This will benefit both her trainees and funding record going forward. Professor Zoldan is a rising star and further professional growth and leadership are sure to come in future years.

Sincerely,



Brenda Ogle, Ph.D.
Professor and Head, Department of Biomedical Engineering
Professor, Department of Pediatrics
Director, Stem Cell Institute
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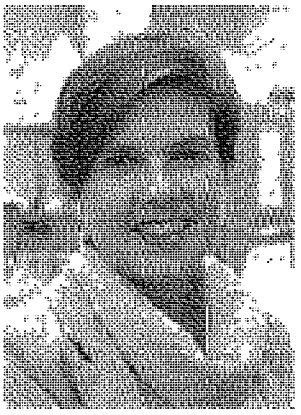
STEM CELL INSTITUTE
Using stem cell biology to change the practice of medicine

MEDICAL SCHOOL

Brenda M. Ogle, PhD

Professor, Department of Biomedical Engineering



Contact Info

ogle@umn.edu (mailto:ogle@umn.edu)

Office Phone 612-624-5948

Office Address:
7-130 Hasselmo Hall

- System Regeneration Lab

Professor, Department of Biomedical Engineering

Director, Stem Cell Institute

Postdoctoral Fellow, Mayo Clinic College of Medicine

PhD, University of Minnesota (Biomedical Engineering), 2000
MS, University of Minnesota (Biomedical Engineering), 1998
BS, College of St. Benedict/St. John's University (Mathematics and Natural Science), 1994

Research

Research Summary/Interests

System Regeneration Lab

The mission of our research program is to investigate the mechanisms of stem cell differentiation, especially in the context of the cardiovascular system. Driven by this mission, we also seek to generate new technologies that advance stem cell biology and promote translation of stem cell research into clinical practice. A primary strength of our program is the ability to span multiple subdisciplines within both basic science (i.e., stem

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Publications

Selected Publications

- Hanson K, Jung J, Tran Q, Hsu SP, Iida R, Eliceiri K, Squirrell J, Lyons G and **Ogle BM.** Spatial and temporal analysis of extracellular matrix proteins in the developing murine heart: a blueprint for regeneration. Tissue Engineering Epub ahead of print. 2013.
- Tran QA*, Su PJ*, Hong JJ, Eliceiri KW, **Ogle BM**, Campagnola PJ. Mesenchymal stem cell interactions with 3D ECM modules fabricated via multiphoton excited photochemistry. Biomacromolecules

READ MORE

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July 8, 2019

Prof Shelly Sakiyama-Elbert
Professor and Chair
Department of Biomedical Engineering
The University of Texas at Austin

Dear Prof Sakiyama-Elbert

I am writing in response to your request for an assessment of Prof Janet Zoldan's scholarly contributions in relation to her consideration for promotion to Associate Professor at the University of Texas at Austin I will address the specific questions you asked in your letter

1 Do you know Dr Zoldan, and if so, for how long and under what circumstances?

I first met Dr Zoldan several years ago at a scientific conference I have followed her work closely since she was a postdoctoral researcher at Technion and MIT Over the past two years Dr Zoldan and I have both served on the Scientific Advisory Board of Biolife 4D, a company involved in 3D bioprinting human heart tissue We have had several phone and email exchanges about pluripotent stem cell culture and differentiation to cardiac and endothelial lineages My lab has sent Dr Zoldan cell lines we've constructed and advised her in getting some of our published protocols working in her lab, but we have not directly collaborated I invited Dr Zoldan to give a seminar in our department last spring Unfortunately our conflicting schedules did not permit her to visit in spring but we scheduled her seminar for fall I am familiar with Dr Zoldan's work, but do not have a relationship with Prof Zoldan that would affect my ability to provide a critical, unbiased assessment of her scholarly contributions

2 What are the original, innovative, and/or important contributions that they have made in their field of research? Have their publications influenced the thinking of, or the methods used by, others in your field?

Prof Zoldan's most impactful research as an independent investigator involves the use of cell-material and biomechanical cues to enhance efficiency of pluripotent stem cell (PSC) differentiation to cardiovascular cell types and improve the quality of the PSC-derived cells This focus is a logical extension of her training in polymer chemistry and biomaterials as a Ph D student and postdoctoral researcher

Over the past 10 years our field has developed very efficient processes for differentiating human PSCs to functional cardiomyocytes. There is tremendous interest in using these cells as *in vitro* models for human development and disease, toxicology and drug discovery studies, and as cellular therapeutics to treat patients with various types of heart failure. However, these human PSC-derived cardiomyocytes are functionally immature, resembling fetal heart cells rather than adult cells. Dr. Zoldan has made important contributions at identifying factors that may improve cardiomyocyte maturation, thereby allowing these cells to achieve their *in vitro* and *in vivo* promise. Another key challenge in the field is to assemble PSC-derived cells into functional tissues. Dr. Zoldan has made contributions in the use of materials to align cardiomyocytes in functional units and to build vascularized scaffolds that will allow basic and translational cardiovascular studies involving PSCs.

In particular, I would like to highlight Prof. Zoldan's development of anisotropic materials to study the influence of mechanics on PSC-derived cardiomyocyte maturation and to guide cardiac tissue formation. In the heart, cells align to bands that facilitate efficient emptying of the heart chambers during contraction. However, in a dish, PSC-derived cardiomyocytes do not organize into higher order structures. In an attempt to guide alignment of PSC-derived cardiomyocytes, Dr. Zoldan's group developed electrospun polymer fibers from blended poly(N-isopropyl acrylamide) (PNIPAAm) and poly(caprolactone) (PCL). These materials can be tuned to control mechanical properties and dissolved thermally, depending on the PNIPAAm and PCL ratios. Dr. Zoldan describes development of this system in a paper in *Biomaterials Science* (Allen et al., 2017). This paper focused on structure-function relationships in how material composition and fiber organization affects stability and ability to support 3T3 cell adhesion and short-term viability. Earlier this year Dr. Zoldan published a paper in *Tissue Engineering Part A* (Allen et al. 2019) using similar anisotropic electrospun PCL scaffolds to investigate how fiber alignment affects mouse embryonic stem cell (ESC) differentiation to cardiomyocytes and behavior of the resulting cardiomyocytes. She reported that alignment didn't affect differentiation, but did induce cardiomyocyte alignment and electromechanical synchronization. This body of work has advanced our ability to induce coordinate, tissue-like structure in stem cell-derived cardiomyocytes. My lab is currently using a similar approach with a different electrospun scaffold to induce alignment in human iPSC-derived cardiomyocytes based on the work from Dr. Zoldan's group.

Another focus of Dr. Zoldan's research has investigated how oxidative stress affects stem cell differentiation to cardiomyocytes. There is a growing appreciation that oxygen levels and a switch to oxidative metabolism correlate with structural maturation in cardiomyocytes. Dr. Zoldan's group demonstrated that reactive oxygen species scavengers reduced differentiation efficiency and downregulated markers of maturation during murine ESC differentiation to cardiomyocytes (Tu et al., *Experimental Cell Research*, 2018). This observation is quite convincing and novel, and opens up promising mechanistic studies moving forward. We and others are taking Prof. Zoldan's work into account in metabolic assessment of human iPSC-derived cardiomyocytes and development of next-generation strategies to mature stem cell-derived cardiomyocytes.

Finally, I would like to highlight Dr. Zoldan's work in vascularization of 3D hydrogels by iPSC-derived endothelial progenitors (iPSC-Eps). Lack of vascularization has plagued the field of

tissue engineering for decades and until it is solved, cardiac cellular therapies will remain infeasible In a recent paper in *Tissue Engineering Part A* (Crosby et al , 2018), Dr Zoldan's group reports a comprehensive, quantitative analysis of vascular network formation by iPSC-EPs in collagen hydrogels The authors reported that vasculogenesis is a complex interplay between the proteolytic and mechanical properties of the cells, and the structure and mechanics of the hydrogel Dr Zoldan's group developed novel image analysis techniques to compare network branching and segment lengths Use of ROCK inhibitor and VEGF stimulates *in vivo*-like network formation Most notably, the authors observed lumen formation, which is elusive to many in the field (including my group) While there is more work to be done in evaluating function and stability of these networks in tissues, this study is a promising advance for the field of stem cell-mediated vascularization

3 How would you assess Dr Zoldan's development compared with others in their cohort at research-intensive universities?

Dr Zoldan's publication record is strong The number of papers she has as an independent scientist (corresponding author and total papers) is above average for faculty at top biomedical engineering departments in the stem cell area She generally publishes her papers in solid biomaterials and bioengineering journals (e g *Tissue Engineering*, *Biomaterials Research*, *Stem Cell Research*) I find Prof Zoldan's papers to be well-written and thorough stories that often contain tool development as well as engineering and basic science advances

Prof Zoldan's growing profile in the field is evidenced by her conference presentations and leadership roles in relevant professional societies (BMES, SFB, TERMIS) She has been invited to review her field for very high impact journals (*Cell Stem Cell* and *Trends in Molecular Medicine*) Dr Zoldan has also been invited to give seminars in a variety of BME departments, particular those with strengths in biomaterials and stem cells I would rate her visibility as above average among her peers

The one area Prof Zoldan lags her peers is obtaining federal funding She has demonstrated the ability to obtain highly competitive grants through her American Heart Association award and this bodes well for her to obtain NIH funding which she will need to keep her research program vibrant Based on the materials provided to me, it looks like Prof Zoldan has several pending NIH and NSF grants, but it isn't yet clear whether these will be funded I am very optimistic about Prof Zoldan's prospects to obtain R01 level funding in the near future based on the quality of the preliminary data she published in 2018-2019 in the areas of cardiac tissue engineering and vascularization using stem cell-derived cells I have seen numerous dossiers similar to Dr Zoldan's where the funding lags the scientific publications and I weigh her contributions to the literature much more heavily than the lack of success at receiving federal funds

It's difficult to compare impact between individuals at this early career stage, but Dr Zoldan's record is consistent with several of her peers in the biomaterials and stem cell area who were promoted in strong engineering departments I would rank her publication impact at this stage as similar to that of Brendan Harley (University of Illinois at Urbana-Champaign), Brenda Ogle (University of Minnesota), and Randolph Ashton (University of Wisconsin – Madison)

4 What is your perspective on Dr Zoldan's promise for further professional growth and leadership?

Prof Zoldan has a clear trajectory toward further establishing her profile as a leader in the field of stem cell-based cardiovascular tissue engineering Her lab at UT-Austin has developed biomaterials and stem cell expertise, and has published strong papers in advancing the maturation state of stem cell-derived cardiomyocytes and the organization of cardiovascular tissues Based on her publications and my personal interactions with Dr Zoldan, she values collaborations and is poised to contribute stem cell expertise to the growth of biomedical sciences at UT-Austin Her lack of federal funding to date poses a threat to realizing this trajectory but I am confident that her record and effort will be rewarded, allowing Prof Zoldan to maintain her momentum in the field and expand her international profile

In summary, in my opinion Dr Zoldan meets the scholarly and research criteria for promotion to Associate Professor with tenure based on the quantity and quality of her independent published work She has established a visible and impactful research program at the interface of biomaterials, stem cell biology, and tissue engineering Please let me know if I can be of any additional assistance in your evaluation of Prof Zoldan

Sincerely yours,

Sean Palecek, Ph D
Milton J and A Maude Shoemaker Professor

Sean P. Palecek, Ph.D.
Milton J and Maude Shoemaker Professor, Chemical and Biological Engineering, Biomedical Engineering, and Materials Science and Engineering, University of Wisconsin - Madison

Professional Preparation

University of Delaware, Newark, DE	Chemical Engineering	B Ch E	1993
University of Illinois, Urbana, IL	Chemical Engineering	M S	1995
MIT, Cambridge, MA	Chemical Engineering	Ph D	1998
University of Chicago, Chicago, IL	Molecular Genetics and Cell Biology	Postdoctoral	2000

Appointments

06/10-present	Professor, Chemical and Biological Engineering, Biomedical Engineering, Materials Science and Engineering, University of Wisconsin - Madison
06/06-06/10	Associate Professor, Chemical and Biological Engineering, Biomedical Engineering, University of Wisconsin - Madison
09/02-06/06	Assistant Professor, Biomedical Engineering, University of Wisconsin - Madison
08/00-06/06	Assistant Professor, Chemical and Biological Engineering, University of Wisconsin - Madison
08/15-present	Senior Fellow, Allen Institute for Cell Science, Seattle, WA
09/17-06/18	Visiting Scientist, Allen Institute for Cell Science, Seattle, WA

Five Products Most Closely Related to the Proposal

1 K K Dunn and S P Palecek, "Engineering scalable manufacturing of high-quality stem cell-derived cardiomyocytes for cardiac tissue repair," Frontiers in Medicine, Vol 5, pp 110-127, 2018

2 V J Bhute, X Bao, K K Dunn, K R Knutson, E C McCurry, G Jin, W H Lee, S Lewis, A Ikeda, and S P Palecek, "Metabolomics identifies metabolic markers of maturation in human pluripotent stem cell-derived cardiomyocytes," Theranostics, Vol 7, pp 2078-2091, 2017

3 X Bao, X Lian, T A Hacker, E G Schmuck, T Qian, V J Bhute, T Han, M Shi, L Drowley, A Plowright, Q D Wang, M J Goumans, and S P **Palecek**, "Long-term self-renewing human epicardial cells generated from pluripotent stem cells under defined conditions," Nature Biomedical Engineering, Vol 1, Article 0003, 2016

4 X Lian, X Bao, M Zilberter, M Westman, A Fisahn, C Hsiao, L B Hazeltine, K K Dunn, T J Kamp, and S P Palecek, "Chemically defined albumin-free cardiomyocyte differentiation," Nature Methods Vol 12, pp 595-596, 2015

5 X Lian, C Hsiao, G F Wilson, K Zhu, L Hazeltine, S M Azarin, K K Raval, T J Kamp, and S P Palecek, "Small molecule modulation of canonical Wnt signaling is sufficient to induce robust cardiac differentiation in human pluripotent stem cells," Proceedings of the National Academy of Science USA, Vol 109, pp E1848-1857, 2012

Five Other Significant Products

6 M J Stebbins, B D Gastfriend, S G Canfield, M S Lee, D Richards, M G Faubion, W J Li, R Daneman, S P Palecek*, and E V Shusta, "Human pluripotent stem cell-derived brain pericyte-like cells induce blood-brain barrier properties," Science Advances, Vol 5, Article eaau7375, 2019

7 V J Bhute, X Bao, and S P Palecek, "Advances in applications of metabolomics in pluripotent stem cell research," Current Opinion in Chemical Engineering, Vol 15, pp 36-43, 2017

8 T Qian, S E Maguire, S G Canfield, X Bao, W R Olson, E V Shusta*, and S P Palecek*, "Directed differentiation of human pluripotent stem cells to blood-brain barrier endothelial cells," Science Advances, Vol 3, Article e1701679, 2017

9 L F Hogle LF, S P **Palecek SP**, D V Schaffer DV, and P W Zandstra, "Characterizing international stem cell research niches," In Regenerative Medicine Ethics Governing Research

and Knowledge Practices, Ed LF Hogle, Springer, 2014
10 E S Lippmann, S M Azarin, J E Kay, R A Nessler, H K Wilson, S P **Palecek***, and E V Shusta*, "Human blood-brain barrier endothelial cells derived from pluripotent stem cells," *Nature Biotechnology*, Vol 30, pp 783-791, 2012

Synergistic Activities

Diversity Executive committee for the Graduate Engineering Research Scholars (GERS) program, which provides a peer network, professional development opportunities, and fellowships for underrepresented graduate students in the College of Engineering Participant in Leaders in Engineering Excellence and Diversity (LEED) program, which recruits women and students from historically underrepresented groups to engineering

Outreach Developed and presents a day long hands-on project on the use of human pluripotent stem cell-derived cardiomyocytes in drug screening and regenerative medicine as part of the Morgridge Summer Science Camp The camp invites 25 students and teachers from rural Wisconsin in three cohorts each year to participate in a week long laboratory experience on stem cell science Regular faculty mentor for REM and REU summer researchers (5 RET and 45 REU to date)

Service in Field Member of NIH Musculoskeletal Tissue Engineering (MTE) study section Associate editor for Biotechnology and Bioengineering, Biotechnology Journal, and BMC Biotechnology

Curricular Developed and taught cross-institutional courses on Stem Cell Engineering and Cellular Biomanufacturing in partnership with colleagues at Georgia Tech, University of Georgia, and University of Puerto Rico – Mayaguez

Knowledge Transfer Associate Director for Research for the NSF Center for Cell Manufacturing Technologies (CMaT) where I direct and monitor research projects across 9 institutions Associate Director for Research for Forward Bio Institute which seeks to transfer UW-Madison research in biomanufacturing to start-up companies

BC

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July 26, 2019

Cockrell School of Engineering
The University of Texas at Austin
Department of Biomedical Engineering
107 W. Dean Keeton St
Austin, TX 78712-0238

I am writing to provide my strong recommendation for Dr. Janet Zoldan to receive tenure and advance in rank to the position of Associate Professor at The University of Texas at Austin in the Department of Biomedical Engineering. By way of background, my current position is a tenured Professor of Surgery in the School of Medicine at the University of Pittsburgh with joint appointments in the Departments of Bioengineering and Chemical Engineering. I also currently serve as the Director of the McGowan Institute for Regenerative Medicine, Editor-in-Chief of the biomaterials journal, *Acta Biomaterialia*, and am the immediate past-chairman for the Tissue Engineering and Regenerative Medicine International Society (TERMIS) Americas. A brief bio can be found at: https://mmm.pitt.net/our-people/faculty-staff-bios/william-r-wagner-phd/. My area of research expertise is cardiovascular biomaterials and tissue engineering.

I first met Dr. Zoldan when she was newly recruited to her current position at University Texas at Austin in 2013 and have been able to watch as she has developed her research area and reputation in the sub-discipline of cardiac stem cell bioengineering. Most recently I had a chance to speak with her at length at the Society for Biomaterials conference this spring held in Seattle, WA. I was impressed with her accomplishments and her vision for moving her work forward to ultimately have clinical impact. My own laboratory has some application areas that overlap with Dr. Zoldan and I know that she is carefully working to address many of the key bottlenecks that prevent the successful application of stem cells in the treatment of cardiac muscle loss following myocardial infarction. With respect to this future impact, Dr. Zoldan is particularly well-positioned to take advantage of the growth and investments in the Dell Medical School at the University.

The work that I believe is the most impactful coming from the Zoldan laboratory is that which focuses on the vision that autologous cardiac tissue can be derived from a patient's own induced pluripotent stem cells (iPSCs) for enlistment in the repair of cardiac wall damage following a heart attack. This concept captured the imagination of the scientific community and the public when iPSC technology first burst onto the scene early this century. However, while compelling in broad

outline, there are many, many barriers to the applications of iPSCs for cardiac regeneration. Janet and her laboratory are diligently addressing some of the key open design barriers. For instance, if one is to generate sheets of cardiac muscle, it is essential that the muscle fibers be aligned and electrically synched to each other. Without these characteristics, one obtains a beating, or more honestly, fluttering mass of tissue in a culture plate. This beating tissue makes for great video presentations to lay audiences, suggesting that cardiac healing may soon follow, but the reality is that this tissue would provide no functional benefit if grafted onto a heart, and indeed, would more likely cause harm by introducing arrhythmic behavior.

Dr. Zoldan has two important publications in her time at UT that move the field beyond randomly beating masses of cardiac tissue from iPSCs towards a more promising engineered tissue. In the first (*Biomater Sci*, 2017) her team describes a method by which an aligned, microfibrous substrate is formed that incorporates a thermoresponsive component. This latter functionality allows cells that have been oriented spatially by the fibrous surface, to be lifted free, as a sheet, from that substrate. In a recent report applying this material to cardiac tissue development (*Tissue Eng A*, 2019), they use the aligned fibers to orient developing cardiomyocytes and demonstrate an ability to achieve synchronized beating while also uncovering new insights as to how cell-cell and cell-substrate interactions control synchronized myocyte contractions. It is noteworthy that the first publication resulted in a journal award to Dr. Zoldan as an "Emerging Young Investigator", as well as a filed U.S. patent.

In another important report on cardiac tissue development in vitro, Dr. Zoldan and her team have explored the role that oxidative activity plays in mouse embryonic stem cell differentiation towards the cardiac phenotype (*Exp Cell Res*, 2018). While the work is early stage, it addresses practical questions for implementing in vitro protocols for cardiac tissue engineering as well as in vivo strategies for controlling the microenvironment's oxidative activity in support of cardiac tissue development. The report has helped to further establish Dr. Zoldan's position in the cardiac stem cell bioengineering field, as evidenced by her recent invitations to write an opinion paper by *Trends in Molecular Medicine* this year on the role of reactive oxygen species in cardiac tissue development generally. She was also recently invited by the prestigious journal, *Cell – Stem Cell*, to provide an invited commentary on the general prospects of using iPSCs to treat myocardial infarction. These latter two invitations provide strong evidence of Dr. Zoldan's emerging leadership role as a scholar in her field.

Another challenge that remains in front of those seeking to develop a meaningfully sized mass of contractile cardiac tissue, is the provision of a vascular supply to effectively nourish and maintain it. This is a general challenge for tissue engineered constructs, but is particularly important for highly metabolically active tissue such as myocardium. In this area Dr. Zoldan is similarly looking to address some of the underlying design challenges by understanding relationships between the cellular microenvironment and the tissue that forms. In particular, her group has published an insightful study (*Tissue Eng A*, 2019) that shows how structural protein (e.g. collagen) density, angiogenic factors, and control of proteolytic activity impact the morphology and connectivity of vascular network formation induced in iPSCs. Tuning of these factors can enhance the formation of a connected network, or divert the process towards dysfunctional, vascular segments that

would not be able to fulfill their key task. To quantify the key morphological parameters, her team developed an image analysis algorithm that resulted in a publication of its own. Her expertise in this aspect of cardiovascular tissue engineering from stem cells has also resulted in her recent invitation to write a review article on angiogenic biomaterials for the journal *Regenerative Biomaterials*.

To support the above mentioned focused research effort, Dr. Zoldan has demonstrated her ability to attract funding from the very competitive American Heart Association, and continues her efforts to secure NIH and NSF funding with several significant pending proposals that would have a significant impact on her laboratory if funded. Given the growth in her scientific reputation over the past couple of years, her expanding set of published reports on her target areas, and her growing leadership perspective evidenced by her commentaries and reviews in the field, I would expect her large federal agency funding dollars to come in very soon. I would also note that she is funded by a grant that shares leadership between UT and the University of Pittsburgh (and other partners) on regenerative rehabilitation. This is a very important, growing area of emphasis in the field of regenerative medicine. I have put my strong support behind the effort coming from Pittsburgh, and I am happy to see that Dr. Zoldan is a very active and funded participant from UT. As she explores this area for potential future funding I believe that she will find effective collaborations and success.

From a simple overview of Dr. Zoldan's CV, one can find further markers of scholarly impact and emerging leadership through her recent awards and achievements such as her most recent accomplishment of being elected as the Secretary-Treasurer for the Engineering Cells and Their Microenvironments Special Interest Group of the Society of Biomaterials and her invitation to speak at the Society for Biological Engineering. The past three years have shown a strong upward trajectory for Dr. Zoldan's research career given her important contribution to a special issue of the highly respected journal, *Tissue Engineering,* and her selection to serve on the Scientific Advisory Board for the *Tissue Engineering and Regenerative Medicine International Society (TERMIS) World Congress*. She has been invited 15 times to give lectures on a national platform and she and her students regularly present their work at international conferences. One of significant attention is her presentation at the prestigious Gordon Research Conference on Biomaterials and Tissue Engineering in 2017. Janet also has evidence of engagement with industry, and serves as a member of the Scientific Advisory Board of Biolife4D, a biotech company committed to the challenges of perfecting bioprinting of a 3D human heart suitable for transplantation.

Dr. Zoldan is publishing at a rate and quality comparable to leading peers in her field. In 2019 she has already published 7 articles, including a cover feature in the May issue of the *Annals of Biomedical Engineering*, the flagship journal of the Biomedical Engineering Society (BMES), which is the leading society for biomedical engineering in the country. Notably, there have been 21 publications out of the Zoldan lab at UT since 2013, with 36 publications in total, and 2 book chapters prior to her time at UT. She is quickly approaching 1000 citations and has an h-index of 13, both parameters are in line with a strong candidate for promotion in an engineering school to the rank of associate professor. As a journal editor, I can personally attest to Janet's excellent

service as a referee, and note that she has provided this service for over 20 leading journals in the field, another marker for her growing reputation in the field.

It is my opinion that Dr. Zoldan has developed to a level commensurate with promotion to associate professor and the awarding of tenure at peer research-intensive universities. While she has not yet been awarded a major grant as PI from the NIH, she has received competitive funding and her productivity has been high. She has also developed a reputation in her discipline and has all of the markers of productivity that one would hope to see from a faculty member at this important juncture. Her potential for further professional growth and leadership are very strong and she is well positioned for success and impact in the growing biomedical collaborative community in Austin.

If further commentary is needed, please do let me know.

Sincerely,

William R. Wagner, PhD
Director, McGowan Institute for Regenerative Medicine
Professor of Surgery, Chemical Engineering, and Bioengineering
University of Pittsburgh

William R. Wagner, Ph.D.

Dr William R Wagner is the Director of the McGowan Institute for Regenerative Medicine and a Professor of Surgery, Bioengineering and Chemical Engineering at the University of Pittsburgh He also serves as Deputy & Scientific Director of the NSF Engineering Research Center on "Revolutionizing Metallic Biomaterials" and Chief Science Officer for the Armed Forces Institute of Regenerative Medicine He holds a B S (Johns Hopkins Univ) and Ph D (Univ of Texas) in Chemical Engineering Dr Wagner's research interests are generally in the area of cardiovascular engineering with projects that address medical device biocompatibility and design, tissue engineering, and targeted imaging

Professor Wagner is the Founding Editor and Editor-in-Chief of one of the leading biomaterials and biomedical engineering journals, *Acta Biomaterialia*, and currently serves on the editorial boards of the "*Journal of Biomedical Materials Research part A*", "*Biotechnology and Bioengineering*", "*Organogenesis*", "*Experimental Biology & Medicine*" and the "*Journal of Tissue Engineering and Regenerative Medicine*" Dr Wagner is also a past president of the American Society for Artificial Internal Organs (ASAIO, 2010-2011), is Chair-Elect for the Tissue Engineering and Regenerative Medicine International Society (TERMIS) Americas region, and serves on the Executive Board of the International Federation of Artificial Organs (IFAO) He is a fellow and former vice president of the American Institute for Medical and Biological Engineering (AIMBE, 2000) and has also been elected a fellow of the Biomedical Engineering Society (2007), the International Union of Societies for Biomaterials Science and Engineering (2008) and the American Heart Association (2001) He has served as Chairman for the Gordon Research Conference on Biomaterials Biocompatibility & Tissue Engineering, for the First TERMIS World Congress and for the 2013 Biomedical Engineering Society Annual Meeting In 2006 he was selected to the "Scientific American 50", the magazine's annual list recognizing leaders in science and technology from the research, business and policy fields In 2011 he was awarded the Society for Biomaterials Clemson Award for Applied Research He has served on numerous NIH and NSF study sections, is a member of the NIH College of Reviewers, and has been a member of external review committees for national and international organizations focused on bioengineering and regenerative medicine His research has generated numerous patents and patent filings that have resulted in licensing activity, the formation of a company that is currently engaged in clinical trials, and University of Pittsburgh Innovator Awards in 2007, 2008, 2009 and 2010 In 2012 he received the Chancellor's Distinguished Research Award from the University of Pittsburgh and in 2013 was awarded the Senior Investigator Award by TERMIS-Americas

BC

Joyce Y. Wong, PhD
Professor
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Fax: (617) 353-6766
Email: jywong@bu.edu
http://people.bu.edu/wonglab

Boston University College of Engineering
Department of Biomedical Engineering
44 Cummington Mall
Boston MA 02215

16 August 2019

Dear Dr. Sakiyama-Elbert,

Below is my evaluation of Dr. Janet Zoldan for promotion to tenured Associate Professor at your institution.

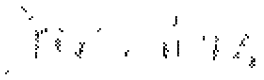
My interactions with Dr. Zoldan: First, you asked me if I know Dr. Zoldan and for long and in what capacity. I have known Dr. Zoldan since the time she was a postdoctoral associate with Dr. Robert Langer. I have met her periodically at scientific conferences, and I have had scientific discussions with her. I have not collaborated with her.

Basis and summary of my review: I have served numerous times on Boston University's College of Engineering Advancement, Promotion and Tenure Committee – serving as Chair one year – and have written numerous evaluation letters for pre-tenure faculty in Biomedical Engineering departments at top institutions. I am also the Inaugural Director of Boston University's women in STEM program (ARROWS) out of the Provost Office: in this administrative role, I have become familiar with criteria for tenure and promotion in the STEM fields at Boston University. I can also comment on Dr. Zoldan's scholarly output as my own research area is in biomaterials and cardiovascular tissue engineering. Upon review of Dr. Zoldan's tenure dossier, I fully support her promotion and tenure and am confident that she would receive tenure at Boston University.

The original contributions that Dr. Zoldan has made are in the area of cardiac differentiation: she has developed a diverse set of biomaterials-based platforms that allows her group to manipulate cardiac cells and investigate the role of substrate anisotropy on cardiac differentiation. Her work is also is thoughtful in the sense that she thinks forward toward how the work will move towards translation (including her patents): this is evident in her paper that developed pNIPAAm based fibers for thermoresponsive release of cells. It is also worth noting that Dr. Zoldan appears to be highly collaborative with her colleagues at UT Austin (e.g. Sacks, Suggs, Stachowiak, etc.): it is worth noting that another large factor when considering granting tenure is how collegial the candidate is, and it is clear that Dr. Zoldan has many successful collaborations at UT-Austin. In the spirit of team science, she appears to be collaborating with appropriate colleagues – i.e. with appropriate expertise – to complement her work. In turn, she has evidence through joint publications of such collaborations and also collaborations in which she provides her expertise to areas that are not directly in her research area but where she is able to contribute significantly. While Dr. Zoldan is collaborative, her research area is also clear – cardiac differentiation, vascularization, and biomaterials – in which she has a significant number of publications solely from her laboratory. Dr. Zoldan also has published a number of articles in special issues, which demonstrates her standing in the field. She also has published an interesting article in JoVE in which she provides a computational model for vascularization which is accessible to the broader scientific community. Dr. Zoldan (from google scholar) has an h-index that is comparable to those at Boston University who have recently been promoted to tenured associate professor. Regarding her promise for future professional growth and leadership, Dr. Zoldan has participated significantly in a number of different scientific societies. I think she can continue to be active and could take on more leadership roles such as Board Member, etc.

An important aspect we consider at Boston University when we consider candidates for tenure is their trajectory, i.e. whether it is on a rise. This is clearly the case for Dr. Zoldan. Her newer work investigating the role of reactive oxygen species (e.g. mitochondrial ROS) is exciting, and I look forward to seeing how redox signaling will regulate stem cell cardiac differentiation. Dr. Zoldan also has quite a broad background in materials science and engineering and in stem cell engineering – I look forward to seeing how she will continue to use this broad knowledge toward attacking important problems in tissue engineering. She also appears to be an excellent mentor, already having graduated two PhD trainees. I have no doubt that her career will continue to be successful and strongly support her tenure case.

Sincerely yours,



Joyce Y. Wong, PhD (Fellow of AIMBE, BMES, AAAS)
Professor in Biomedical Engineering & Materials Science and Engineering
Inaugural Term Distinguished Professor of Engineering
Office of the Provost, Director of ARROWS: Advance, Recruit, Retain & Organize Women in STEM

OMB No. 0925-0001 and 0925-0002 (Rev. 09/17 Approved Through 03/31/2020)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Wong, Joyce Y.

eRA COMMONS USER NAME: WONG.JOYCE

POSITION TITLE: Professor of Biomedical Engineering & Materials Science and Engineering

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Massachusetts Institute of Technology, Cambridge	S.B.	06/1988	Materials Sci and Eng
Massachusetts Institute of Technology	Ph.D.	06/1994	Biomaterials & Polymers
University of California, Santa Barbara	Postdoctoral	08/1998	Biophysics & Surface Science

A. Personal Statement

Dr. Wong is a Professor in Biomedical Engineering (BME) and the Division of Materials Science and Engineering (MSE) and a College of Engineering Distinguished Faculty Fellow at Boston University. My research focuses on the development of biomaterials to probe how structure, material properties and composition of the cell-biomaterial interface affect fundamental cellular processes. My current research interests include tissue engineering of small diameter blood vessels for pediatric vascular repair; development of targeted nano- and micro-particle contrast agents for multi-modal (magnetic resonance, ultrasound, and optical) detection of cancer and surgical adhesions.

B. Positions and Honors

Positions:

1998-2006	Clare Boothe Luce Assistant Professor, Dept. of Biomedical Engineering, Boston University
1998-	Faculty, Molecular Biology, Cell Biology, and Biochemistry Program, Boston University
1998-	Faculty, Biomolecular Pharmacology Program, Boston University School of Medicine (BUSM)
2005-	Faculty Mentor, Boston University Beckman Scholars Program
2006-2013	Associate Professor, Dept of Biomedical Engineering, Boston University
2006-2008	Associate Director, Boston University Center of Nanoscience and Nanobiotechnology
2006-2010	Associate Chair for Graduate Studies, Department of Biomedical Engineering, Boston University
2009-	Faculty, Whitaker Cardiovascular Institute, Boston University
2009-	Faculty, Center for Regenerative Medicine (CReM), Boston University
2010-	Faculty, Division of Graduate Medical Sciences, BU School of Medicine
2012-2015	Co-Director, Affinity Research Collaborative in Nanotheranostics, BU
2013-	Professor, Dept of Biomedical Engineering and Division of Materials Science & Engineering, BU
2013-	Office of the Provost, Inaugural Director, ARROWS: Advance, Recruit, Retain & Organize Women in STEM at BU
2016	Faculty, BU-BMC Cancer Center
2016	Faculty, Precision Diagnostics Center, BU College of Engineering

Selected Honors:

1996-1998	National Institutes of Health, NRSA (Postdoctoral Fellowship)
1998	Clare Boothe Luce Assistant Professorship in Biomedical Engineering
2000	NSF CAREER Award
2001	National Academy of Science Frontiers in Engineering Selected Participant
2003	National Academies Keck Futures Initiatives Conference Selected Participant

2009	Elected Fellow of American Institute for Medical and Biological Engineering (AIMBE)
2009-2014	Boston University College of Engineering Distinguished Faculty Fellow
2009	The Hartwell Foundation, Individual Biomedical Research Award
2011	Chair, Gordon Research Conference on Biomaterials & Tissue Engineering
2011-2014	Elected to Board of Directors, Biomedical Engineering Society
2012	Collaborator of the Year Award in Basic Physical Sciences and Engineering, Boston University, Dept. of Medicine Evans Center for Interdisciplinary Biomedical Research
2013	Elected to Biomedical Engineering Society Class of 2013 Fellows
2014-	Inaugural Term Distinguished Professor of Engineering, Boston University
2015	Faculty Service Award, Boston University, College of Engineering
2016	Conference Co-Chair, 90th American Chemical Society Colloid and Surface Science Symposium
2016-2018	Co-Chair, AIMBE Women
2017	Elected Fellow of AAAS
2017	Charles DeLisi Distinguished Lecturer, Boston University, College of Engineering
2017	Volume Organizer, Materials Research Society (MRS) Bulletin
2017-	Associate Editor, *Biomedical Materials (Institute of Physics)*
2018	Advocate of the Year Award BU Graduate Women in Science and Engineering
2019-	Associate Editor – The Americas, *Drug Delivery and Translational Research (Springer)*
2019	Lead, Boston University AAAS STEM Equality Achievement "SEA Change" Bronze Pilot Institutional Award

C. Abbreviated Contributions to Science

Complete List of Published Work in My Bibliography:
http://www.ncbi.nlm.nih.gov/sites/myncbi/joyce.wong.1/bibliography/40327282/public/?sort=date&direction=descending

1. A major challenge in vascular tissue engineering has been the ability to preserve the organization of native vessels in engineered tissues. We hypothesize that the structural organization of cells and extracellular matrix are critical for achieving functional mechanical properties of the tissue. In addition, our studies have demonstrated that cell phenotype is modulated by physiochemical properties of the underlying substrate. We have developed several methods to generate cell sheets that can be micropatterned and stacked in desired orientations. In addition, we have recently designed and fabricated a novel tissue stretching device that can measure the mechanical properties of single cell sheets. To our knowledge, the ability to test the mechanics of single cell sheets has not been reported yet; this will be important for computational models we are developing to aid in vascular tissue engineering.

2. A major focus of my laboratory is the study of physicochemical factors that control vascular smooth muscle cell (VSMC) phenotype. A mechanistic understanding of cell-biomaterial interactions can aid in vascular tissue engineering to promote appropriate cellular organization and functional phenotype. One of our early findings was that vascular smooth muscle cell migration is dependent on the stiffness gradient strength – we developed novel gradient substrata to systematically investigate cell migration. More recently, we have discovered that VSMC response to substrate stiffness is dependent on the specific extracellular matrix (ECM) molecules that are presented to the cell. These findings are exhibited as changes in VSMC adhesion, spreading, cytoskeletal polymerization, and focal adhesion assembly. More recently, we have observed that ECM composition also affects VSMC durotaxis (migration in response to substrate stiffness gradients).

3. We have recently developed ultrasound contrast microbubbles that have enhanced stability compared to commercially available microbubbles. Ultrasound contrast agents were originally developed to provide contrast for blood flow and were intended to be stable on the order of minutes. However, targeted ultrasound contrast agents that aim to detect molecular features of disease would not be very useful if their stability and lifetime is only on the order of minutes. To this end, we have developed polymerized shell microbubbles that have significantly enhanced lifetimes compared to commercially available microbubbles. We have further developed these microbubbles to deliver drug payloads and have tested them in blood vessels-on-a-chip in collaboration with Noo Li Jeon's group at Seoul National University. Through these model studies, we are able to investigate underlying mechanisms of microbubble interactions with microvessels and can screen efficacy of targeting ligands and drugs.

Tuesday, September 3, 2019 at 12:19:01 PM Central Daylight Time

Subject: FW: Reference Request for Dr. Janet Zoldan
Date: Monday, June 10, 2019 at 3:11:36 PM Central Daylight Time
From: Sakiyama-Elbert, Shelly E
To: Cunningham, Carrie N

–
SHELLY SAKIYAMA-ELBERT, Professor and Chair
The University of Texas at Austin | Department of Biomedical Engineering |
512.471.3604 | www.bme.utexas.edu

From: Kyriacos Athanasiou <athens@uci.edu>
Date: Monday, June 10, 2019 at 3:10 PM
To: "Sakiyama-Elbert, Shelly E" <sakiyama@utexas.edu>
Subject: RE: Reference Request for Dr. Janet Zoldan

Dear Carrie,

It is great to hear from you but, unfortunately, I will not be able to help. Pls do not let my inability to do this reflect in any way negatively on the candidate.

[illegible]

From: Cunningham, Carrie N <carrie.c@austin.utexas.edu> **On Behalf Of** Sakiyama-Elbert, Shelly E
Sent: Monday, June 10, 2019 1:04 PM
To: Kyriacos Athanasiou <athens@uci.edu>
Subject: Reference Request for Dr. Janet Zoldan
Importance: High

Dear Dr. Athanasiou:

As Professor and Chair of the Department of Biomedical Engineering at UT-Austin, I write to request your evaluation of Dr. Janet Zoldan for promotion to the title of Associate Professor in the Department of Biomedical Engineering at The University of Texas at Austin. I have attached an electronic copy of the formal request letter with instructions for an evaluation, as well as Dr. Zoldan's current CV, and a selection of her five most significant publications in rank.

If you are able, please provide your evaluation by **Monday, July 22.** An electronically signed document on your letterhead is perfectly acceptable and can be sent as a reply to this e-mail address. Please also

include a biosketch or CV (ideally 2 pages or less).

Please do not hesitate to contact myself or Carrie Cunningham (Dept. Manager) at carrie.c@austin.utexas.edu if you have any questions.

Thank you for taking the time to assist us with this effort!

Best regards,
Shelly

--

SHELLY SAKIYAMA-ELBERT Professor and Chair
The University of Texas at Austin | Department of Biomedical Engineering | 512.471.3604 |
https://www.bme.utexas.edu

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